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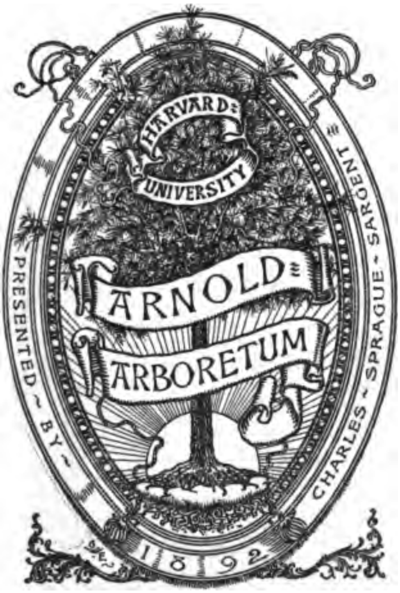

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON.

WITH THE ADDRESSES READ ON THE OCCASION OF THE

DARWIN MEMORIAL MEETING,

MAY 12, 1882.

PUBLISHED WITH THE CO-OPERATION OF THE SMITHSONIAN INSTITUTION.

VOLUME I.

NOVEMBER 19, 1880, TO MAY 26, 1882.

WASHINGTON:
PRINTED FOR THE SOCIETY.
1882.

PUBLICATION COMMITTEE.

G. BROWN GOODE.
RICHARD RATHBUN.
LESTER F. WARD.

INTRODUCTORY NOTE.

THIS volume of Proceedings is published in obedience to the vote of the Society, passed May 26, 1882. The BIOLOGICAL SOCIETY OF WASHINGTON was organized December 3, 1880, and at the time of its summer adjournment, in 1882, carries upon its roll the names of one hundred and thirty-nine active members, one honorary member, and twenty corresponding members. It has held thirty-one regular meetings, three special meetings, and one field meeting. At its regular meetings fifty-four communications have been presented, nearly all of which, except informal verbal communications, have already been published, as is indicated in the bibliographical foot notes. It has inaugurated and, in conjunction with the Anthropological Society, carried on a course of eight popular scientific lectures, four of which were delivered in its special behalf, and all of which were delivered by its members.

The meetings of the Society have always been held in rooms provided by the courtesy of the Secretary of the Smithsonian Institution; the first fifteen in the Regents' Room of the Smithsonian Institution; the sixteenth to the twenty-fourth in the Archive Room of the National Museum; the subsequent meetings in the Lecture Room of the Museum.

In preparing the proceedings of the Society for publication, the Secretaries have omitted the record of the election of members from the minutes of the several meetings, the information there contained being presented in a much more convenient form in the "List of Members."

LIST

OF THE

Council and Officers

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON.

1882.

COUNCIL.

THEODORE GILL, *President.*

TARLETON H. BEAN.
JOHN W. CHICKERING, Jr.
G. BROWN GOODE.
JEROME H. KIDDER.
OTIS T. MASON.
D. WEBSTER PRENTISS.
RICHARD RATHBUN.
ROBERT RIDGWAY.
CHARLES V. RILEY.
HENRY ULKE.
GEORGE VASEY.
LESTER F. WARD.

OFFICERS.

PRESIDENT.

THEODORE GILL.

VICE PRESIDENTS.

CHARLES V. RILEY.
JOHN W. CHICKERING, Jr.
LESTER F. WARD.
HENRY ULKE.

SECRETARIES.

G. BROWN GOODE.
RICHARD RATHBUN.

TREASURER.

ROBERT RIDGWAY.

LIST OF MEMBERS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON.

JULY 1, 1882.

HONORARY MEMBERS.

Date of Election.	
1881, Jan. 14.	BAIRD, SPENCER FULLERTON, M. D., LL. D., M. N. A. S. Secretary of the Smithsonian Institution and Director of the U. S. National Museum. U. S. Commissioner of Fish and Fisheries. *Smithsonian Institution, and 1445 Massachusetts Avenue N. W.*

CORRESPONDING MEMBERS.

1882, Mar. 31.	AGASSIZ, ALEXANDER, A.B., S. B., M. N. A. S. Curator of the Museum of Comparative Zoology, Cambridge. *Cambridge, Massachusetts.*
1881, April 8.	ALLEN, JOEL ASAPH, M. N. A. S. Assistant in Ornithology in the Museum of Comparative Zoology, Cambridge. *Cambridge, Massachusetts.*
1882, April 28.	BREWER, WILLIAM HENRY, Ph. D., M. N. A. S. Professor of Agriculture in the Sheffield Scientific School, Yale College, New Haven. *New Haven, Connecticut.*
1881, Feb. 25.	BREWSTER, WILLIAM, *Cambridge, Massachusetts.*
1881, Feb. 25.	BROOKS, WILLIAM KEITH, Ph. D. Associate Professor of Biology and Director of the Marine Laboratory of Johns Hopkins University, Baltimore. *Baltimore, Maryland.*
1882, Jan. 6.	COLLETT, ROBERT, Docent and Assistant in the Zoological Museum of the University of Christiania. *Christiania, Norway.*
1882, April 14.	DERBY, ORVILLE ADELBERT, M. S., Chief of the Geological Survey of Brazil. *Rio de Janeiro, Brazil.*
1882, Jan. 6.	FARLOW, WILLIAM GILSON, A. M., M. D., M. N. A. S. Professor of Cryptogamic Botany in Harvard University. *Cambridge, Massachusetts.*

Date of Election.	CORRESPONDING MEMBERS—Continued.
1881, Mar. 11.	Giglioli, Enrico Hillyer, Director of the Royal Zoological Museum of Vertebrates, and Professor of Vertebrate Zoology in the Royal Institute, Florence. *R. Instituto de Studi Superiori, Florence, Italy.*
1882, Jan. 6.	Gray, Asa, M. D., LL. D., M. N. A. S. Fisher Professor of Natural History in Harvard University. *Botanic Garden, Cambridge, Massachusetts.*
1882, Mar. 31.	Grimm, Oscar von, Ph. D., Professor of Natural History in the *Forest Academy*, St. Petersburg. *St. Petersburg, Russia.*
1882, Jan. 6.	Hyatt, Alpheus, S. B., M. N. A. S. Professor of Zoology and Paleontology in the Massachusetts Institute of Technology. Custodian of the Boston Society of Natural History. *Cambridge, Massachusetts.*
1881, April 8.	Lawrence, George N., *45 East 21st St., New York City.*
1882, Mar. 31.	Morse, Edward S., M. N. A. S. Director of the Peabody Academy of Science, Salem. *Salem, Massachusetts.*
1882, Mar. 31.	Packard, Alpheus Spring, Jr., M. D., M. N. A. S. Professor of Zoology and Geology in Brown University, Providence. *Providence, Rhode Island.*
1882, Mar. 3.	Smith, Sidney Irving, Ph. B. Professor of Comparative Anatomy in Yale College, New Haven. *New Haven, Connecticut.*
1881, Feb. 25.	Velie, John W., M. D. Secretary and Curator of the Chicago Academy of Sciences. *263 Wabash Avenue, Chicago, Illinois.*
1882, Mar. 31.	Verrill, Addison Emory, A. M., S. B., M. N. A. S. Professor of Zoology and Curator of the Zoological Collections in Yale College, New Haven. *New Haven, Connecticut.*
1882, April 28.	Watson, Sereno, Ph. D., M. N. A. S. Curator of the Herbarium of Harvard University. *Botanic Garden, Cambridge, Massachusetts.*
1882, Mar. 3.	Wilson, Edmund Beecher, Ph. D. Assistant in the Biological Laboratory of Johns Hopkins University, Baltimore. *Baltimore, Maryland.*

ACTIVE MEMBERS.*

Date of Election.	
Orig. Member.	Ashford, Francis Asbury, M. D. Dean of Faculty and Professor of Surgery in the Medical Department of the University of Georgetown. *1330 New York Avenue N. W.*
1881, Jan. 14.	Baker, Frank, M. D. Assistant Demonstrator of Anatomy and Prosector to the chair of Anatomy in the Medical Department of Columbian University. *Office of Light House Board, and 326 C Street N. W.*
1882, Mar. 3.	Barker, John Shepard, *715 H Street N. W.*
1881, Nov. 11.	Barnard, William Stebbins, S. B., Ph. D. Assistant in the Entomological Division, U. S. Department of Agriculture. *1303 Q Street N. W.*
Orig. Member.	Bean, Tarleton Hoffman, M. D. Curator, Dep't of Fishes, U. S. National Museum. *National Museum, and 1404 S Street N. W.*
1881, Mar. 25.	Bessels, Emil, M. D., Ph. D. *1441 Massachusetts Avenue N. W.*
1881, Nov. 11.	Beyer, Henry G., M. D. Passed Assistant Surgeon, U. S. Navy. *Naval Hospital.*
1882, Mar. 17.	Billings, John Shaw, A. M., M. D. Surgeon and Brevet Lieutenant Colonel, U. S. Army. Librarian of the Surgeon General's Office. *Surgeon General's Office, and 3027 N Street N. W.*
1881, Jan. 14.	Birney, Herman Hoffman, *1901 Harewood Avenue, Le Droit Park.*
1882, Jan. 20.	Birney, Gen. William, *1901 Harewood Avenue, Le Droit Park.*
1882, Feb. 17.	Blish, John Bell, Midshipman U. S. Navy, on duty in the National Museum. *Smithsonian Institution.*
1881, Nov. 11.	Bransford, John Francis, M. D. Passed Assistant Surgeon, U.S.N., on duty at the Smithsonian Institution. *Smithsonian Institution.*
Orig. Member.	Brown, James Templeman, Aid, U. S. National Museum. *National Museum, and 1425 S Street N. W.*

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* When not otherwise expressly stated, all addresses are in Washington. By the word 'Founder" are designated those who signed the call for the meeting for organization, November 26, 1880; by "Orig. Member" those who attended this and the succeeding meeting.

Date of Election.	ACTIVE MEMBERS—Continued.
Orig. Member.	Brown, Stephen Carvosso, Registrar, U. S. National Museum. *National Museum, and 928 B Street S. W.*
Orig. Member.	Burdick, Edson Almeron, *Pension Office, and 406 Spruce Street N. W.*
1882, Mar. 17.	Burnett, Swan Moses, M. D. Lecturer on Ophthalmology and Otology in the Medical Department of the University of Georgetown. *1215 I Street N. W.*
Orig. Member.	Busey, Samuel Clagett, M. D. Professor of the Theory and Practice of Medicine in the Medical Department of the University of Georgetown. *1525 I Street N. W.*
1881, June 3.	Canby, William Jackson, *413 Tenth Street N. W.*
1881, June 3.	Carman, Myron Albert, D.D.S., *1015 Fourteenth St. N. W.*
1882, Feb. 17.	Chase, Henry Sanders, Midshipman, U. S. Navy, on duty in the National Museum. *Smithsonian Institution.*
Founder.	Chickering, Rev. John White, Jr., A. M. Professor of Natural Science in the Columbia Institution for the Deaf and Dumb. *Kendall Green, N. E.*
1881, May 20.	Chickering, John Jameson, A. M. Teacher in the Public Schools. *Kendall Green, N. E.*
1882, Mar. 17.	Christie, Alexander Smyth, Astronomical Computer in the U. S. Coast and Geodetic Survey. *Coast Survey Office, and 207 New Jersey Avenue N. W.*
1881, Jan. 28.	Clark, Alonzo Howard, Special Agent in the Fishery Division of the Tenth Census. *National Museum, and 933 G Street N. W.*
1881, Feb. 25.	Collins, Joseph William, Special Agent in the Fishery Division of the Tenth Census. *National Museum, and Gloucester, Massachusetts.*
Orig. Member.	Comstock, John Henry, S. B. Assistant Professor of Ethnology and Lecturer on the Zoology of Invertebrates in Cornell University, Ithaca. *Ithaca, New York.*
1881, Dec. 23.	Conant, Woodbury Page, Assistant Botanist, Department of Agriculture. *Agricultural Department.*
1881, Dec. 23.	Coues, Elliott, M. D., Ph. D., M. N. A. S. Professor of Anatomy in the Medical Department of Columbian University. *Smithsonian Institution, and 1321 N Street N. W.*

Date of Election.	ACTIVE MEMBERS—Continued.
1881, Nov. 11.	Cox, William Van Zant, A. B. *Fish Commission Office, and 1011 Twelfth Street N. W.*
1881, Feb. 25.	Dale, Frank C., M. D. Passed Assistant Surgeon, U. S. N., on U. S. Steamer "Palos" on China Station.
1881, Jan. 28.	Dall, William Healey, Assistant, U. S. Coast and Geodetic Survey. Honorary Curator, Dept. of Mollusks, U. S. National Museum. *Coast Survey Office, and 1119 Twelfth Street N. W.*
1882, Feb. 3.	Davis, Harry C., A. B. Adjunct Professor of Greek in Columbian University. *637 Maryland Avenue S. W.*
1881, Feb. 25.	DeHaas, Wills, M. D. *Care of Bureau of Ethnology, Smithsonian Institution.*
1881, Nov. 11.	Dewey, Frederick Perkins, Ph. B. Assistant, Dept. of Metallurgy, U. S. National Museum. *National Museum, and Whitney Avenue N. W.*
1881. Nov. 11.	Dodge, Charles Richards, Special Agent, Tenth Census, Division of Fruit and Orchard Statistics. *1336 Vermont Avenue N. W.*
1882, Jan. 20.	Dosh, Frank Bowman. *Johns Hopkins University, Baltimore.*
1881, Jan. 28.	Earll, Robert Edward, S. B. Special Agent in the Fishery Division of the Tenth Census. *National Museum, and 601, M Street N. W.*
1881, Feb. 25.	Elliott, Henry Wood. *Smithsonian Institution, and Cleveland, Ohio.*
1881, Nov. 25.	Ellzey, Mason Graham, A. M., M. D. Lecturer on Hygiene and Medical Jurisprudence in the Medical Department of the University of Georgetown. *1012 I Street N. W.*
1881, Jan. 28.	Ferguson, Thomas B., Assistant Commissioner of Fisheries. *1435 Massachusetts Avenue N. W.*
1881, Mar. 25.	Fletcher, Robert, M. D,, Acting Assistant Surgeon, U. S. Army. *Surgeon General's Office, and 1326 L Street N. W.*
1881, Feb. 11.	Flint, James Milton, M. D. Surgson, U. S. Navy. Honorary Curator, Section of Materia Medica, U. S. National Museum. *National Museum, and Riggs House.*
1881, Dec. 9.	Foreman, Edward, M. D. Assistant, U. S. National Museum. *National Museum, and 200 Eleventh Street S. W.*

Date of Election.	ACTIVE MEMBERS—Continued.
1882, Feb. 17.	GARRETT, LEROY MASON, Midshipman, U. S. Navy, on duty at the National Museum. *Smithsonian Institution.*
1881, Mar. 25.	GANNETT, HENRY, S. B., A.Met.B. Geographer of the Tenth Census and of the U. S. Geological Survey. *Office of Geological Survey, and 1881 Harewood Ave., Le Droit Park.*
Orig. Member.	GEDNEY, CHARLES DEFOREST, *Coast Survey Office, and 115 F Street N. E.*
1881, Mar. 11.	GIHON, ALBERT LEARY, A. M., M. D. Member of Naval Board of Inspection. Medical Director, U. S. Navy. *1736 I Street N. W.*
1882, April 28.	GILBERT, GROVE KARL, Geologist, U. S. Geological Survey. In charge of the Division of the Great Basin. *Office of Geological Survey, and 1881 Harewood Ave., Le Droit Park.*
Founder.	GILL, THEODORE NICHOLAS, M. D., Ph. D., M. N. A. S. Lecturer on Natural History in Columbian University. *Cosmos Club, and 321 and 323 Four-and-a-half Street.*
Founder.	GOODE, GEORGE BROWN, A. M. Assistant Director of the U. S. National Museum. Chief of Division of Fisheries, U. S. Fish Commission, and Special Agent in charge of Fishery Division, Tenth Census. *Smithsonian Institution, and 1620 Massachusetts Avenue N. W.*
Orig. Member.	GORE, JAMES HOWARD, S. B. Adjunct Professor of Mathematics in Columbian University. Honorary Curator of the Food Collection, U. S. National Museum. *Columbian University, and 1305 Q Street N. W.*
1881, Nov. 11.	GRIFFITH, SAMUEL HENDERSON, M. D. Passed Assistant Surgeon, U. S. Navy. *Bureau of Medicine, U. S. Navy.*
Orig. Member.	HASSLER, FERDINAND AUGUSTUS, M. D. *1234 Thirteenth Street N. W., and Tustin City, Los Angeles Co., California.*
1881, Feb. 25.	HAWES, GEORGE WESSON, Ph. D. Curator, Dept. of Mineralogy, U. S. National Museum. Special Agent in charge of the Building Stone Division, Tenth Census. **Died at Colorado Springs, Colorado, June 23, 1882.**
1882, Feb. 3.	HAWKES, WILLIAM HIMES, A. B., M. D. Acting Assistant Surgeon, U. S. Army. *U. S. Army Dispensary, and 1105 F Street N. W.*
1882, Feb. 17.	HAYDEN, EDWARD EVERETT, Midshipman, U. S. Navy, on duty at the National Museum. *Smithsonian Institution.*

Date of Election.	ACTIVE MEMBERS—Continued.
1882, Mar. 31.	Henshaw, Henry Wetherbee, Special Agent in the Indian Division of the Tenth Census. *Bureau of Ethnology, Smithsonian Institution, and 903 M Street N. W.*
1881, Jan. 14.	Hessel, Rudolph, Ph. D., Superintendent of Government Carp Ponds. *514 Tenth Street N. W.*
Orig. Member.	Hoffman, Walter James, M. D. *Bureau of Ethnology, Smithsonian Institution, and 222 E Street N. W.*
1882, April 14.	Hornaday, William Tell, Chief Taxidermist U. S. National Museum. *National Museum, and Harewood Avenue, Le Droit Park.*
1882, May 26.	Hough, Franklin Benjamin, Ph. D. Chief of Division of Forestry, U. S. Department of Agriculture. *Agricultural Department.*
1882, April 27.	Hough, Myron Beach Warner. *U. S. Treasurer's Office, and 312 Indiana Avenue N. W.*
Orig. Member.	Howard, Leland O., S. B. Assistant in the Entomological Division, U. S. Department of Agriculture. *Agricultural Department, and 1407 Fifteenth Street N. W.*
1881, Feb. 25.	Howland, Edwin Perry, M. D. *211 Four-and-a-half Street N. W.*
Founder.	Ingersoll, Ernest. *New York City.*
1882, Mar. 3.	Johnson, Arnold Burgess, A. M., Chief Clerk, U. S. Light House Board. *Le Droit Park.*
1882, Jan. 20.	Johnson, Blanchard Freeman. *Le Droit Park.*
1882, Feb. 3.	Johnson, Joseph Taber, A.M., M.D. Professor of Obstetrics and Diseases of Women and Infants, in the Medical Department of the University of Georgetown. Gynecologist to Providence Hospital. *937 New York Avenue N. W.*
Orig. Member.	Jouy, Pierre Louis, Assistant Naturalist of U. S. Steamer "Palos" on China Station.
Orig. Member.	Kidder, Jerome Henry, A.M., M. D. Surgeon, U. S. Navy. *Bureau of Medicine, U. S. Navy, and 1601 O Street N. W.*
Orig. Member.	King, Albert Freeman Africanus, M. D. Professor of Obstetrics and Diseases of Women and Children, in the Medical Department of Columbian University. *726 Thirteenth Street N. W.*

Date of Election.	ACTIVE MEMBERS—Continued.
1881, Nov. 25.	KOEBELE, ALBERT, Aid, U. S. National Museum. *1700 Thirteenth Street N. W.*
Orig. Member.	LEE, WILLIAM, M. D. Professor of Physiology in the Medical Department of Columbian University. *2111 Pennsylvania Avenue N. W.*
1882, Mar. 17.	LEECH, DANIEL, *Smithsonian Institution, and 1507 Vermont Avenue N. W.*
1882, Jan. 20.	LEHNERT, REV. E., Pastor, German Lutheran Church.
1881, Jan. 28.	MCDONALD, MARSHALL, Chief of Division of Propagation and Transportation, U. S. Fish Commission. Commissioner of Fisheries for the State of Virginia. Special Agent Fishery Division of Tenth Census. *Fish Commission Office, and 909 Twenty-third Street N. W.*
1881, May 20.	MCMURTRIE, WILLIAM, E. M., M. S., Ph. D. Examiner of Wool in the U. S. Department of Agriculture. *Agricultural Department, and 1728 I Street N. W.*
1881, Nov. 11.	MANN, BENJAMIN PICKMAN, A.M. Assistant in the Entomological Division, U. S. Department of Agriculture. *Agricultural Department, and 1203 Q Street N. W.*
1882, Feb. 17.	MARSH, CHARLES CARROLTON, Midshipman, U. S. Navy, on duty at National Museum. *Smithsonian Institution.*
1882, Jan. 20.	MARTIN, FRANK, Aid, U. S. National Museum. *National Museum, and 1835 G Street N. W.*
Orig. Member.	MARX, GEORGE, Zoological Draughtsman, U. S. Department of Agriculture. *Agricultural Department, and 1626 Fourteenth Street N. W.*
Orig. Member.	MASON, OTIS TUFTON, Ph. D. Principal of the Preparatory Department of Columbian University. *1305 Q St. N. W.*
1881, Jan. 28.	MERRILL, GEORGE PERKINS, M. S. Aid, U. S. National Museum. *National Museum, and 3033 N Street N. W.*
1881, June 3.	MILLER, BENJAMIN, Jr. *1516 Thirty-first Street N. W.*
1882, Feb. 17.	MINER, RANDOLPH HUNTINGTON, Midshipman, U. S. Navy, on duty at National Museum. *Smithsonian Institution.*
1881, Dec. 9.	NELSON, EDWARD W., U. S. Signal Service observer at St. Michael's, Alaska. *Smithsonian Institution.*
Orig. Member.	NORRIS, BASIL, M. D. Surgeon and Brevet Colonel, U. S. Army. *1829 G Street N. W.*

Date of Election.	ACTIVE MEMBERS—Continued.
Founder.	PATTON, WILLIAM HAMPTON, A. B. *New York City.*
Orig. Member.	PERGANDE, THEODORE, Assistant in Entomological Division, U. S. Department of Agriculture. *321 D Street N. W.*
Orig. Member.	PORTER, JOHN HAMPDEN, M.D. *2720 M Street N. W.*
1881, Feb. 11.	POWELL, JOHN WESLEY, Ph. D., LL. D., M. N. A. S. Director, U. S Geological Survey, and Director, Bureau of Ethnology, Smithsonian Institution. *National Museum, and 910 M Street N. W.*
Orig. Member.	PRENTISS, DANIEL WEBSTER, A.M., M.D. Professor of Materia Medica and Therapeutics, in the Medical Department Columbian University. Commissioner of Pharmacy, District of Columbia. *1224 Ninth Street N. W.*
Founder.	RATHBUN, RICHARD, Curator, Dep't of Marine Invertebrates, U. S. National Museum. *Smithsonian Institution, and 1622 Massachusetts Avenue N. W.*
1881, May 20.	RAU, CHARLES, Ph. D. Curator, Dept. of Antiquities, U. S. National Museum. *Smithsonian Institution.*
1881. Dec. 9.	REYBURN, ROBERT, A. M., M. D. Professor of Physiology and Hygiene, Medical Department, Howard University. *2129 F Street N. W.*
Founder.	RIDGWAY, ROBERT, Curator, Dep't of Birds, U. S. National Museum. *Smithsonian Institution, and 218 Eleventh Street S. W.*
Founder.	RILEY, CHARLES VALENTINE, Ph. D. President, U. S. Entomological Commission. Entomologist U. S. Department of Agriculture. Honorary Curator, of Insects in the U. S. National Museum. *Agricultural Department, and 1700 Thirteenth Street N. W.*
1882, Mar. 17.	RICHEY, STEPHEN OLIN, M. D. *1426 New York Avenue.*
1882, April 28.	RUSSEL, ISRAEL COOK, Assistant Geologist U. S. Geological Survey. *Salt Lake City, Utah.*
1882, Mar. 31.	RYDER, JOHN ADAM, Embryologist, U. S. Fish Commission. *Smithsonian Institution, and Chambersburg, Pa.*
Orig. Member.	SCHÆFFER, EDWARD MARTIN, M. D. *St. Cloud Building, and 1114 Nineteenth Street N. W.*
1882, Jan. 20.	SCHÖNBORN, HENRY. *213 Seventh Street N. W.*
1881, Mar. 11.	SCHUERMANN, CARL WILHELM, *U. S. National Museum and 916 D Street S. W.*

Date of Election	ACTIVE MEMBERS—Continued.
Orig. Member.	Schwarz, Eugene Amandus, Assistant in the Entomological Division, U. S. Department of Agriculture. *606 H Street N. W.*
1881, Jan. 14.	Scudder, Charles Willis, Clerk, U. S. Fish Commission. *127 F Street N E.*
Orig. Member.	Scudder, Newton Pratt, A.M. Aid, U. S. Fish Commission. *127 F Street N. E.*
1882, May 26.	Seaton, Charles W., Superintendent of the Tenth Census. *Census Office, and 303 M Street N. W.*
Orig. Member.	Seaman, William Henry, A. M. Professor of Chemistry in the Medical Department of Howard University. *1424 Eleventh Street N. W.*
Orig. Member.	Sheldon, Charles Stiles. *Census Office.*
1881, Nov. 11.	Shufeldt, Robert Wilson, M.D. Assistant Surgeon and Captain U. S. Army. Hon. Curator, Section of Bird Skeletons U. S. National Museum. *National Museum, and 819 Seventeenth Street N. W.*
1882, Feb. 17.	Shute, Daniel Kerfoot, A. B. Children's Hospital. *Columbian College Hill.*
1881, Nov. 11.	Smith, William Robert, Superintendent of U. S. Botanical Garden. *Botanical Garden.*
Orig. Member.	Smiley, Charles Wesley, A. M. Chief of Division of Records, U. S. Fish Commission. Special Agent, Fishery Division, Tenth Census. *Fish Commission Office, and 1207 Eleventh Street N. W.*
1881, Nov. 11.	Stejneger, Leonhard, (of Bergen, Norway.) Aid U. S. National Museum. Absent in Siberia.
1881, Mar. 25.	Sternberg, George Miller, M.D. Surgeon, U. S. Army. Secretary of the National Board of Health. *Fort Point San José, San Francisco, Cal.*
1882, Mar. 17.	Stevenson, James, Executive Officer of the U. S. Geological Survey. *National Museum.*
1881, Feb. 25.	Stimpson, William Gordon. *National Museum, and 211 Twelfth Street S. W.*
1882, Feb. 17.	Streets, Thomas Hale, M. D. Passed Assistant Surgeon, U. S. Navy. *Bureau of Medicine, U. S. Navy.*

Date of Election.	ACTIVE MEMBERS—Continued.
1882, Mar. 17.	Taylor, Frederick William, Chemist, U. S. National Museum. *National Museum, and 1120 Vermont Avenue N. W.*
Orig. Member.	Taylor, Thomas, M. D. Microscopist, U. S. Department of Agriculture. *Agricultural Department, and 238 Massachusetts Avenue N. E.*
1881, Dec. 9.	Thompson, John Ford, M. D. Professor of Surgery, Medical Department, Columbian University. *1000 Ninth Street N. W.*
1881, Jan. 28.	Todd, James Edward, Ph. D. Professor of Natural History in Tabor College and Lecturer in Beloit College. *Tabor, Iowa.*
Orig. Member.	Toner, Joseph Meredith, M. D. *615 Louisiana Avenue N. W.*
Founder.	True, Frederick William, M. S. Librarian, and Curator Dep't of Mammals, U. S. National Museum. *National Museum, and 3033 N Street N. W.*
1881, Dec. 23	Turner, Lucien M., Observer, U. S. Signal Service. *Ungava, Labrador.*
Orig. Member.	Ulke, Henry, *1111 Pennsylvania Avenue N. W.*
1881, Mar. 25.	Upham, Edwin Porter, Aid, U. S. National Museum. *Smithsonian Institution, and 1317 Eleventh Street N. W.*
Founder.	Vasey, George, M. D. Botanist, U. S. Department of Agriculture. *Agricultural Department, and 1437 S Street N. W.*
Founder.	Ward, Lester Frank, A. M., LL. B. Paleo-botanist, U. S. Geological Survey. Honorary Curator, Dep't of Fossil Plants, U. S. National Museum. *National Museum, and 1464 Rhode Island Avenue N. W.*
Orig. Member.	White, Charles Abiathar, A. M., M. D. Curator, Dep't of Fossil Invertebrates, U. S. National Museum. Palæontologist U. S. Geological Survey. *National Museum, and 409 Maple Avenue, Le Droit Park.*
1881, May 20.	White, Maurice Putnam, Teacher, Public Schools. *507 Sixth Street N. W.*
1881, Jan. 28.	Williams, Alfred, *Department of State, and 134 C Street N. E.*

Date of Election.	ACTIVE MEMBERS—Continued.
Orig. Member.	Wilson, Joseph McMunn. *U. S. Pension Office, and 1108 Maryland Avenue S. W.*
1881, Dec. 9.	Winslow, Francis, Lieutenant, U. S. Navy, on duty with U. S. Fish Commission. *Brightwood, D. C.*
1881, Jan. 28.	Wolfley, William Irvin, A. M., M.D. *140 C Street N. E.*
1882, Feb. 17.	Yarnall, John Hepburn, M. D. *3028 P Street N. W.*
Orig. Member.	Yarrow, Henry Crécy, M. D. Acting Assistant Surgeon U. S. Army. Hon. Curator, Dept. of Reptiles U. S. National Museum. *Surgeon General's Office, and 814 Seventeenth Street N. W.*
1881, Feb. 25.	Yeates, William Smith, A. M. Aid, U. S. National Museum. *National Museum, 2522 L Street N. W.*
1882, Jan. 6.	Zumbrock, Anton, M. D., Electrotyper and Photographer, U. S. Coast and Geodetic Survey. *Coast Survey Office, and 306 C Street N. W.*

THE BIOLOGICAL SOCIETY OF WASHINGTON

CONSTITUTION.

Adopted December 3, 1880.

ARTICLE I.

NAME.

The name of this Society shall be "THE BIOLOGICAL SOCIETY OF WASHINGTON."

ARTICLE II.

OBJECTS.

Its objects shall be to encourage the study of the Biological Sciences, and to hold meetings at which papers shall be read and discussed.

ARTICLE III.

MEMBERS.

The Society shall consist of active, corresponding and honorary members. Candidates for membership shall be proposed to the Council, in writing, by at least three members, and, upon recommendation of the majority of the Council present at its regular meeting, shall be balloted for at the earliest ensuing meeting. A majority vote of the members present when the ballot is taken shall be necessary to election.

ARTICLE IV.

OFFICERS.

The officers shall be a President, four Vice Presidents, two Secretaries, and a Treasurer. There shall be a Council, consisting of the officers of the Society and five members, to be elected by the Society. A quorum of the council shall consist of seven members.

Its duties shall be to act on nominations for membership, have the direction of the finances, audit the accounts of the Treasurer, and provide a programme for each meeting of the Society.

The officers shall be elected by ballot at each annual meeting, and shall serve one year, or until their successors are elected.

ARTICLE V.

PRESIDENT AND VICE PRESIDENTS.

The President, or, in his absence, one of the Vice Presidents, shall preside at meetings of the Society and Council. The presiding officer shall appoint all committees in the Council and in the Society, unless otherwise ordered. It shall be the duty of the retiring president to deliver an address at the second meeting in January.

ARTICLE VI.

SECRETARIES.

The Secretaries shall take and preserve correct minutes of the proceedings of the Society and Council and a record of the members, shall conduct its correspondence, give due notice of all meetings, and inspect and count all ballots.

ARTICLE VII.

TREASURER.

The Treasurer shall have charge of all money and other property of the Society, and shall make disbursements under the direction of the Council. He shall collect all fees and assessments, and notify members who may be in arrears.

ARTICLE VIII.

SECTIONS.

Sections for special work in any department of Biology may be formed upon the recommendation of the Council.

ARTICLE IX.

MEETINGS.

Stated meetings shall, unless otherwise ordered, be held on Friday of each alternate week, at eight o'clock P. M. The annual meeting for the election of officers shall be the first meeting in January. Special and field meetings may be called by the Council.

ARTICLE X.

FEES.

The initiation fee shall be one dollar; the annual fee one dollar. Members in arrears for one year shall, after due notification by the Treasurer, be dropped from the rolls. No member in arrears shall be entitled to vote at the annual meeting for the election of officers.

ARTICLE XI.

AMENDMENTS TO THE CONSTITUTION.

The constitution of the Society may be amended by a two-thirds vote of the members present at any regular meeting, after at least four weeks' notice.

ARTICLE XII.

ORDER OF BUSINESS.

The order of business at each regular meeting, unless otherwise provided by the Council, shall be as follows:

I. Reading of minutes.
II. Reports of Committees.
III. Balloting for members.
IV. Nominations for membership.
V. Miscellaneous business.
VI. Reading of papers, discussions and exhibition of specimens.

Article XII may be suspended at any time by a two-thirds vote of the members present.

PROCEEDINGS.

PRELIMINARY MEETING, November 19, 1880.

In response to a letter of invitation signed by C. V. Riley and G. Brown Goode, ten gentlemen met at the house of the former, No. 1700 Thirteenth Street N. W., to take into consideration a project for the organization of a natural history society in the city of Washington. Capt. C. E. Dutton, U. S. A. was chosen chairman. After an informal interchange of views and a discussion of various propositions advanced by those present, it was decided to send out a call for a general meeting to be held on the following Friday evening, to which all known to be interested in the objects of the proposed society should be invited. The following persons were in attendance at this preliminary meeting: Captain Clarence E. Dutton, Prof. Theodore Gill, Messrs. G. Brown Goode, Ernest Ingersoll, W. H. Patton, Richard Rathbun, C. V. Riley, Frederick W. True, Lester F. Ward, and Dr. George Vasey.

MEETING FOR ORGANIZATION, November 26, 1880.

In response to a call signed by C. E. Dutton, J. W. Chickering, Jr., Theodore Gill, G. Brown Goode, Ernest Ingersoll, W. H. Patton, Richard Rathbun, Robert Ridgway, C. V. Riley, F. W. True, Lester F. Ward, and George Vasey, about thirty gentlemen assembled in the Regents' Room, at the Smithsonian Institution. Prof. Riley was elected chairman, and Mr. Goode, Secretary. After much discussion it was decided to organize a society to be called THE BIOLOGICAL SOCIETY OF WASHINGTON. A committee consisting of Messrs. Gill, Goode, Rathbun, Riley, and Ward was appointed to draw up a form of constitution for the proposed society, and to submit the same at a meeting to be held on the evening of Friday, December 3.

First Meeting, December 3, 1880.

Thirty-five gentlemen assembled in the Regents' Room of the Smithsonian Institution, to hear the report of the Committee appointed to prepare a constitution for the projected society. Prof. Riley acted as chairman and Mr. Goode as secretary. The committee presented its report, and the form of constitution proposed by them was read article by article, and article by article modified and adopted. The constitution as a whole, in the form appended to these proceedings, was then adopted. The Society then adjourned to Friday evening, December 10, at which time a meeting was appointed for the completion of the organization of the Society by the election of a board of officers.

Second Meeting, December 10, 1880.

Twenty-two persons met in the usual place. Professor Gill was called to the chair, and, on the motion of Prof. Ward, the Society proceeded to ballot for officers for the ensuing year. The following board of officers was elected:

President—Theodore Gill.

Vice-Presidents—C. V. Riley, J. W. Chickering, Lester F. Ward, Henry Ulke.

Secretaries—G. Brown Goode, Richard Rathbun.

Treasurer—Robert Ridgway.

Members of Council—J. H. Comstock, O. T. Mason, J. H. Kidder, A. F. A. King, George Vasey.

The Society then adjourned to meet on the 24th of December.

Third Meeting, December 24, 1880.

The President occupied the chair, and thirty-one members were present.

Messrs. Riley, Goode and King were announced as having been appointed a committee on communications. Dr. Tarleton H. Bean presented a communication entitled Notes on a voyage along the Coasts of Alaska and Siberia in the summer of 1880.*

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* Published in part in the *New York Times* for September 17, November 21, and December 6, 1880.

FOURTH MEETING, January 14, 1881.

(First Annual Meeting.)

The President occupied the chair and thirty members were present.

In accordance with the recommendation of the Council one of the Secretaries of the Society was instructed to cast the vote of its members for the entire board of officers elected at the meeting of December 10, such having been the understanding at the time of that election. The officers elected at that time were then announced as having been re-elected to serve during the coming year.

The President announced that the Secretary had been authorized to have printed 250 copies of the constitution, with list of officers and members, and requested all members to send in their full names, that the customs of similar societies might be conformed to.

Prof. L. F. Ward read a paper entitled THE FLORA COLUMBIANA OF 1830 AND 1880, which contained comparisons between the list of the plants of the District of Columbia printed in 1830 by Dr. Brereton and the lists perfected by the resident botanists of to-day.*

Prof. D. S. Jordan, of the Indiana State University, read a paper entitled THE SALMON OF THE PACIFIC COAST.†

FIFTH MEETING, January 28, 1881.

The President occupied the chair, and thirty-six members were present.

The President delivered his first annual address upon THE PRINCIPLES OF BIOLOGY WITH REFERENCE TO TAXONOMY.‡

In the discussion of the presidential address, Messrs. Comstock, Mason, Ward, Riley and White participated.

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* Included in the following paper:

1882. WARD, LESTER F. Guide | to | the Flora | of | Washington and Vicinity | By | Lester F. Ward, A. M. | —— | Washington: Government Printing Office, | 1881. *8vo.*, pp. 264 + 2, *with map* = Bulletin of the U. S. National Museum, No. 22. (U. S. National Museum, No. 26.)

† 1881. JORDAN, DAVID S., AND CHARLES H. GILBERT. Observations on the Salmon of the Pacific. <American Naturalist. XV, 1881, (March,) pp. 177–186.

‡ The essentials of this address are embodied in the articles BIOLOGY (Vol. I, 1875,) and MORPHOLOGY (Vol. III, 1877,) in *Johnson's Cyclopedia*. New York, 1875–8

SIXTH MEETING, February 11, 1881.

The President occupied the chair, and thirty-seven members were present.

An hour was devoted to the completion of the discussion of the presidential address, Messrs. White, Ward, King and Gill taking part. Dr. J. H. Kidder, U. S. N., exhibited a series of photo-micrographs of objects obtained floating in the air of Washington. He also exhibited photo-micrographs of the dry rot fungus from the U. S. Steamer "Portsmouth," after its infection by yellow fever, of spores of various organisms collected in the yellow fever hospitals of Cuba, and of blood corpuscles from patients affected by various febrile diseases.*

SEVENTH MEETING, February 25, 1881.

Prof C. V. Riley, V. P., occupied the chair and thirty-two members were present.

Prof Riley read a paper entitled THE FERTILIZATION OF YUCCA.† Dr. C. A. White gave an account of a collection of fossils, including 1500 species, duplicates of the celebrated collection of James Hall, State Geologist of New York, recently received by the National Museum from the American Museum of Natural History in New York. Mr. Frederick W. True read a paper entitled SUCTORIAL PREHENSION IN THE ANIMAL KINGDOM.‡

EIGHTH MEETING, March 11, 1881.

The President occupied the chair, and thirty-four members were present.

In discussing Mr. True's paper on "Suctorial Prehension" Prof.

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* 1881. KIDDER, JEROME H. Report | on | an examination | of the | external air of Washington | by J. H. Kidder, M. D., | Surgeon, U. S. Navy. | —— | [Extracted from the Report of the Surgeon General | of the Navy for 1880.] | —— | Washington: | Government Printing Office. | 1882. | 8vo., pp. 22 + 1 (+ 1), 10 plates.

† 1881. RILEY, CHARLES V. Further notes on the Pollination of Yucca and on Pronuba and Prodoxus. <Proceedings of the American Association for the Advancement of Science. 1881, Vol. XXIX, Part II, pp. 617–639, figs. 1–16.

‡ To be published in the proceedings of the U. S. National Museum.

Seaman referred to the climbing organs of the Virginia creeper, *Ampelopsis quinquefolia*, and of the so called "suckers" of various sea-weeds, which though perhaps not suctorial in action seem to cling to objects in a manner which is similar to suctorialism. Prof. Riley spoke of a suctorial organ of prehension in the thoracic proleg and anal pseudopod of *Simulium* larvæ and to the ventral branchiæ of the helgramite or dobson, *Corydalis cornutus*, larva, which are suctorial in function. Prof. Gill, speaking of the suctorial powers of young marsupiates stated that he believed them to exert an actual suctorial power, even though the teats be somewhat modified to aid them in clinging. Their first attachment to the teat is purely suctorial, though afterward probably the result of a spasm-like action of the sphincter-oris muscle. He also referred to the suctorial organs possessed by certain bats. Mr. Patton called attention to the peculiar structure of the larva of *Blepharocera* which inhabits torrents and has six segments, each provided with a separate suctorial organ, probably prehensive.

Dr. A. F. A. King read a paper entitled SEPTENARY PERIODICITY IN LIVING ORGANISMS; in the discussion of which Messrs. Prentiss, Riley, Scudder, Ward, and many others participated.

NINTH MEETING, March 25, 1881.

The President occupied the chair, and thirty-five members were present.

Col. Marshall McDonald read a communication ON THE LAWS OF THE RELATION OF PERIODICITY IN DEVELOPMENT TO TEMPERATURE. This paper was discussed by Messrs. Prentiss, King, Busey, Gill and Chickering.

Prof. J. W. Chickering, Jr., read a paper entitled ROAN MOUNTAIN AND ITS FLORA.*

Prof. J. E. Todd read a paper entitled ON THE FLOWERING OF SOLANUM ROSTRATUM, AND CASSIA CHAMÆCRISTA.†

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* See 1882. CHICKERING, JOHN W., Jr. Notes on Roan Mountain, North Carolina. < Bulletin, Philosophical Society of Washington. IV. 1881. pp. 60–64. (Flora, p. 63).

†1882. TODD, JAMES E. On the Flowers of *Solanum rostratum*, and *Cassia chamæcrista*. <American Naturalist. XVI, 1882. (April). pp. 281–287.

TENTH MEETING, April 8, 1881.

The President occupied the chair, except when reading his paper, at which time he was replaced by Vice President Ward. Twenty-three members were present.

Prof. Gill read a paper entitled A CRITICAL REVIEW OF GUNTHER'S STUDY OF FISHES,* and a short discussion upon the merits of this article ensued, participated in by Messrs. Goode, Gill and Ward.

ELEVENTH MEETING, April 22, 1881.

The President occupied the chair, and thirty-eight members were present.

A committee of the Council submitted the following report upon the formation of sections, in accordance with one of the provisions of the Constitution:

> The committee recommends, (1.) That five sections be formed as follows: I, Vertebrates; II, Articulates; III, Mollusks; IV, Radiates; V, Plants. For these sections the following members are suggested as chairmen: I, Mr. Goode; II, Prof. Riley; III, Mr. Dall; IV, Mr. Rathbun; V, Prof. Ward. (2.) The members of the Society shall be requested to inform the Secretary what section or sections they desire to co-operate with. (3.) New members on joining the Society shall be requested to signify to the Secretary what departments of Biology they are each respectively interested in. Signed by the Committee: C. V. Riley, O. T. Mason, George Vasey, G. Brown Goode, Robert Ridgway.

The President announced that the temporary chairman would be authorized to call meetings of the sections, and that members were expected to hand in their decisions as to the sections which they desire to join.

Dr. George M. Sternberg, U. S. A., Secretary of the National Board of Health, read a paper entitled A FATAL FORM OF SEPTI-

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* 1881. GILL, THEODORE. Reprinted from the "Forest and Stream." | —— | Günther's | Literature and Morphography of Fishes. | A review of | Dr. Günther's introduction to the | study of Fishes. | —— | By Theodore Gill, M. A., M. D., Ph. D., | Member of the National Academy of Sciences, etc., etc. | —— | New York : | Forest & Stream Publishing Co., | 1881. 12mo., pp. 16. See also *The Critic*, 1, (May 21, 1881,) pp. 132–3; *The New York Times*, May 29, 1881; *Forest & Stream*, XVI, p. 428, (June 30, 1881;) *Science*, VII, pp. 323–6, (July 9, 1881;) *The Nation*, XXXIII, pp. 120–2, (August 11, 1881.)

CÆMIA IN THE RABBIT, PRODUCED BY THE SUBCUTANEOUS INJECTION OF HUMAN SALIVA.*

This paper was discussed by Messrs. Thomas Taylor, Fletcher, King, Comstock, Ward, and Gill.

Mr. Ernest Ingersoll read a paper entitled ON THE MORTALITY OF MARINE ANIMALS IN THE GULF OF MEXICO.*

At the close of the meeting the roll of members was called, and the following persons enrolled themselves as members of the several sections:

Section I. Messrs. Baker, Birney, Clark, Earll, Gill, Goode, Hoffman, King, Mason, Prentiss, Ridgway, N. P. Scudder, C. W. Scudder, Smiley, Thomas Taylor, True, Ward, Wolfley, Fletcher, Flint, Schuermann, Sternberg.

Section II. Messrs. Birney, Comstock, Merrill, Patton, Pergande, Riley, Schwarz, Marx, Howard, and Ulke.

Section III. Messrs. Gill, Sheldon, and Ingersoll.

Section IV. Messrs. Gill and Rathbun.

Section V. Messrs. Comstock, Earll, Goode, Gore, Merrill, Patton, Riley, Schwarz, Seaman, Sheldon, Smiley, Thomas Taylor, Vasey, Ward, Williams, Wolfley, Sternberg, Hawes, Flint, and Hoffman.

FIRST FIELD MEETING, April 30, 1881.

On Saturday, April 30, the Botanical Section held a field meeting at High Island, in the Potomac River, above the Chain Bridge. Seventeen members were present.

TWELFTH MEETING, May 6, 1881.

Vice-President Ward occupied the chair. Twenty-three members were present.

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* 1881. STERNBERG, GEORGE M. A fatal form of Septicæmia in the Rabbit, produced by the sub-cutaneous injection of Human Saliva. <Studies from the Biological Laboratory of Johns Hopkins University. II. 1882, pp. 183–200. Plate XIV. (March.)

* 1881. INGERSOLL, ERNEST. On the Fish Mortality in the Gulf of Mexico. IV. <Proceedings, U. S. National Museum, IV, 1881, pp. 74–80.

Prof. Lester F. Ward read a paper entitled A STATISTICAL VIEW OF THE FLORA OF THE DISTRICT OF COLUMBIA.*

Prof. J. H. Comstock read a paper entitled NOTES ON SCALE INSECTS, illustrating his remarks by a collection of specimens.†

THIRTEENTH MEETING, May 20, 1881.

The President occupied the chair. Thirty-one members were present.

Prof. Riley made some remarks upon Prof. Comstock's paper on Scale Insects, and was responded to by Prof. Comstock. Dr. George M. Sternberg, U. S. A., read a paper entitled ON MICROCOCCUS SEPTICUS‡ illustrating his remarks by photo-micrographs thrown upon a screen by the lantern. This paper was discussed by Messrs. Seaman, Ward, and Taylor.

FOURTEENTH MEETING, June 3, 1881.

The President occupied the chair. Thirty-five members were present. It was announced that after the next meeting the Society would be adjourned until the first Friday in October.

Dr. D. W. Prentiss read a paper entitled THE PHYSIOLOGICAL ACTION OF JABIRANDI, (PILOCARPUS PINNATIFOLIUS.)§

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* 1881. WARD, LESTER F. Field and Closet Notes on the Flora of Washington and Vicinity. <Bulletin, Philosophical Society of Washington. IV. 1881. pp. 64–120. (Statistical View pp. 88–104, 116–119.) See also in Bulletin 22 U. S. National Museum, cited above, p. 26.

† 1881. COMSTOCK, JAMES H. Report on Scale Insects. <Report of the Entomologist of the U. S. Department of Agriculture for the year 1880. pp. 235–373. (Scale Insects, pp. 276–349. Plates III–XXII.)

‡ STERNBERG, GEORGE M. A Contribution to the Study of the Bacterial Organisms commonly found upon exposed Mucous Surfaces, and in the Alimentary Canal of Healthy Individuals. <Studies from the Biological Laboratory of Johns Hopkins University. II. 1882. pp. 157–181. Plates XI–XIII: and in Proceedings, American Assoc. Adv. Sci., XXX, 1881.

§ 1881. PRENTISS, D. WEBSTER. Remarkable change of color of the hair from light blonde to nearly jet black in a patient, while under treatment by pilocarpin. Report of pyelo-nephritis, with unusually prolonged anuria. <Philadelphia Medical Times. XI. 1881. (No. 335, July 2, 1881.) pp. 609–12; also reprinted with following title:

—— 1. | Remarkable change in the color of the | hair from light blonde to

Mr. G. Brown Goode read a paper entitled THE MACKEREL,* and was followed by Captain J. W. Collins who explained and illustrated the uses of the various kinds of apparatus used in the mackerel fishery.†

FIFTEENTH MEETING, June 17, 1881.

The President occupied the chair. Fifty-two members were present.

Mr. Robert Ridgway exhibited a collection of wild and domesticated turkeys. Mr. Newton P. Scudder made a communication upon the breeding habits of the Painted Tortoise, *Chrysemys picta.* Dr. Thomas Taylor exhibited some specimens of a tapeworm from the common hog.‡ Mr. Frederick W. True exhibited the first volume of the new annual, *Zoologischer Jahresbericht*, published in Leipzig, and compared its merits with those of the London *Zoological Record* Prof. C. V. Riley exhibited specimens of the seventeen-year locust, and the Rocky Mountain locust, explaining the difference between them and describing their habits.§

The Society then adjourned to the basement of the Smithsonian Building, where Col. Marshall McDonald described some recent

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black in a | patient while under treatment by | pilocarpin.—Report of a | pyelo-nephiritis, with unusu- | ally prolonged anuria. | 2. | Care ot membranous croup treated suc- | cessfully by pilocarpin. | By | D. W. Prentiss, A.M., M. D., | Professor Materia Medica and Therapeutics, National Medical College, Washington, D. C. | — | Printed by | J. B. Lippincott & Co., Philadelphia. | 1881. 8vo., pp. 15+1.

Also—Change in the color of the human hair under the use of pilocarpin. <Cincinnati Lancet and Clinic. XLVI. 1881. (Sept. 3.) pp. 202–205; colored plate and < Proceedings of American Association for the Advancement of Science, XXX, (Cincinnati Meeting,) 1881.

* 1882. GOODE, G. BROWN. Natural History of the Mackerel. <Materials for a History of the Mackerel Fishery in Report U. S. Fish Commission. Part VII for 1881, pp. (1)–(48.)

† 1882. COLLINS, JOSEPH W. (With G. Brown Goode.) The Mackerel Fishery of the United States. Ibid. pp. (49)–(140+.)

‡ 1882. TAYLOR, THOMAS. On a tape-worm from the common hog. <Report of the Commission of Agriculture for 1882, pp.——. (In press.)

§ 1881. RILEY, CHARLES V. The Periodical Cicada *alias* "Seventeen-year Locust." <American Naturalist, XV, 1881, pp. 479–481, one figure.

experiments in fish culture, illustrating his remarks by apparatus in which the eggs of the shad, *Clupea sapidissima*, were in process of hatching. He announced that he had succeeded in keeping shad eggs for twenty-four hours in a half dry condition in moist cloth, and in thus transporting them from place to place, instead of the old cumbersome vessels filled with water.*

Mr. John A. Ryder exhibited, under the microscope, eggs of the shad in various stages of development, and announced the discovery of teeth in shad four or five days old. †

SIXTEENTH MEETING, October 28, 1881.

The President occupied the chair. Thirty-two members were present.

This evening the Society met for the first time in the Archive Room of the National Museum. Prof. Lester F. Ward exhibited a supposed petrifaction, resembling the hand of a mammal, from near Granger's Station, Wyoming. A discussion followed upon the phenomena of opalization, and the formation of pseudomorphs, in which Messrs. Taylor, Gill, Schaeffer, Dall, and Ulke participated. Mr. Henry W. Elliott read a paper ON THE HABITS OF THE SEA OTTER, (PUSA LUTRIS,) OF THE NORTHWEST COAST, illustrating his remarks by specimens and sketches on the blackboard.‡

Dr. Thomas Taylor exhibited a new form of freezing microtome, invented by himself, and demonstrated its manner of working.§

SEVENTEENTH MEETING, November 11, 1881.

The President occupied the chair. Twenty-eight members were present.

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*See Report of the U. S. Commission of Fisheries for 1881, (Part VIII,) and Transactions of the American Fish Cultural Association for 1882.

†1882. RYDER, JOHN A. The Protozoa and Protophytes considered as the primary or indirect source of the food of fishes. <Bull., U. S. Fish Comm., I, 1882, pp. 236–251. (Eggs and food of young shad, pp. 248–9.)

‡To be printed in the forthcoming Census report on the Fisheries of the United States.

§1882. TAYLOR, THOMAS. On a new form of freezing microtome. <Proc. Amer. Assoc. Adv. Sci., XXX, (Cincinnati Meeting,) 1881, p. 119.

Prof. C. V. Riley read a paper entitled ON THE PHILOSOPHY OF THE RETARDATION OF GROWTH AMONG LOWER ANIMALS.* A discussion followed, participated in by Messrs. Ulke, White, Gill, Earll, King, and Ward. Dr. C. A. White read a paper entitled ANTIQUITY OF CERTAIN TYPES OF NORTH AMERICAN NON-MARINE MOLLUSCA, AND THE EXTINCTION OF OTHERS.† This paper was discussed by Messrs. Gill and Dall.

EIGHTEENTH MEETING, November 25, 1881.

The President occupied the chair. Thirty-four members were present.

Mr. Richard Rathbun presented a communication ON THE RECENT EXPLORATIONS OF THE U. S. FISH COMMISSION. After sketching the history of the Commission since its organization, in 1871, and describing the new exploring steamer "Fish Hawk," he spoke at some length of the wonderful wealth of life discovered in 1880 and 1881 on the inner edge of the Gulf Stream, about one hundred miles off Newport and Martha's Vineyard. Mr. Rathbun's remarks were illustrated by numerous specimens, and a large model of the steamer "Fish Hawk." Messrs. Gill, Dall, Goode, and Schaeffer took part in the discussion of this paper.

NINETEENTH MEETING, December 9, 1881.

The President occupied the chair. Forty members were present.

Col. Marshall McDonald described some recent observations upon young shad in confinement. Prof. L. F. Ward read a paper on THE CAUSES OF THE ABSENCE OF TREES ON THE GREAT PLAINS.‡

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*1882. RILEY, CHARLES V. Retarded Development in Insects. <Proceedings, Amer. Assoc. Adv. Sci., XXX, Cincinnati Meeting, and in separate "Retarded Development, &c.," pp. 4. (February, 1882.)

†1882. WHITE, CHARLES. A. On Certain Conditions attending the Geological Descent of some North American types of Fresh-water Gill-bearing Mollusks. <American Journal of Science and Arts. XXIII. 1882, (May.) pp. 382–6. Annual Report of the U. S. Geological Survey for 1882.

‡1882. WARD, LESTER F. On the Cause of the Absence of Trees on the Great Plains. <Kansas City Review of Science and Industry. V. 1882, pp. 697-702. (March.)

Prof. Gill read a paper entitled ON THE AFFINITIES OF THE "GREAT SWALLOWER," CHIASMODUS NIGER.* He stated the genus *Chiasmodus* to be the representative of a peculiar family, *Chiasmodontidæ*, and not at all allied to the *Gadidæ*. Its first dorsal has inarticulate spines and its ventrals are of the Acanthopterygian type. The group is indeed related to the *Harpagiferidæ* and *Chænichthyidæ* and should have been referred by Dr. Günther to his heterogeneous "family *Trachinidæ*."

TWENTIETH MEETING, December 23, 1881.

The President occupied the chair. Thirty members were present.

Dr. R. W. Shufeldt, U. S. A., read a paper entitled ON THE OSTEOLOGY OF THE GLASS SNAKE, (OPHEOSAURUS VENTRALIS.)† Prof. Otis T. Mason read a paper entitled THE INVASION OF THE DOMAIN OF BIOLOGY BY ANTHROPOLOGISTS. Mr. Frederick W. True read a paper entitled THE LAND TORTOISES OF NORTH AMERICA.‡

TWENTY-FIRST MEETING, January 6, 1881.

(Second Annual Meeting.)

The President occupied the chair. Thirty-five members were present.

The following officers were elected for the year 1882:

President—Prof. THEODORE GILL.

Vice Presidents—C. V. RILEY, Prof. J. W. CHICKERING, Jr., LESTER F. WARD, and HENRY ULKE.

Secretaries—G. BROWN GOODE and RICHARD RATHBUN.

Treasurer—ROBERT RIDGWAY.

Members of Council—Dr. J. H. KIDDER, U. S. N., Dr. GEORGE VASEY, Dr. T. H. BEAN, Dr. D. WEBSTER PRENTISS, Prof. O. T. MASON.

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*1879. GILL, THEODORE. The Great Swallower. <Forest & Stream. XIII. 1879, p. 906, (Dec. 18,) with figures. (A part only of the remarks made to the Society.)

† 1882. SHUFELDT, ROBERT W. Remarks upon the Osteology of Opheosaurus ventralis. <Proceedings U. S. National Museum. IV. 1882. pp. 392–400. Nine figures.

‡ 1882. TRUE, FREDERICK W. On the North American Land Tortoises of the Genus Xerobates. <Proceedings U. S. National Museum. IV. 1882. pp. 434–449. Three figures.

TWENTY-SECOND MEETING, January 20, 1882.

The President occupied the chair. Forty-five members were present.

The President delivered the annual address on the topic THE HISTORY OF CLASSIFICATION IN ZOOLOGY.

In his introductory remarks he congratulated the Society upon its present flourishing condition, stating that during the year its membership had nearly doubled. He also reviewed the history of other scientific societies of the city, mentioning the National Institute, the Botanical Society, the Potomac Side Naturalists' Club, the Physical Club, and the Geological and Geographical Society, all now extinct, and the existing Philosophical, Anthropological, and Biological Societies. He also spoke of the eminent zoologists who had been, in the early days of its history, identified with the Potomac Side Naturalists' Club, the predecessor of the Biological Society, mentioning the names of Prof. S. F. Baird, Count L. F. de Pourtales, Dr. William Stimpson, Mr. Robert Kennicott, Prof. J. S. Newberry, Mr. H. Ulke, Dr. Harrison Allen, Dr. Elliott Coues, Dr. D. W. Prentiss, Dr. F. V. Hayden, Mr. F. B. Meek, Baron R. von Osten Sacken, Dr. William A. Hammond, Prof. Burt G. Wilder, Dr. George Suckley, Mr. Titian R. Peale, and others.

TWENTY-THIRD MEETING, February 3, 1882.

Prof. Lester F. Ward, V. P., occupied the chair. Thirty-three members were present.

Mr. Frederick W. True read a paper ON THE ARCTIC SEA COW, (RHYTINA STELLERI.)* Mr. Henry W. Elliott exhibited drawings of the same extinct animal, and submitted a restoration by himself, the merits of which he advocated.

Mr. Frederick W. True exhibited an immense specimen of *Siren lacertina*, twenty-six inches in length, captured in the mud flats in front of the city of Washington. This species had not previously been recorded north of North Carolina.

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* To be published in the forthcoming Census Report on the Fishery industries of the United States.

TWENTY-FOURTH MEETING, February 3, 1882.

The President occupied the chair. Thirty-three members were present.

An animated discussion concerning the form of the tail, as well as the relationship and history of the Arctic Sea Cow, *Rhytina Stelleri*, took place. This was participated in by Messrs. Elliott, True, Coues, and Gill.

TWENTY-FIFTH MEETING, March 3, 1882.

The President occupied the chair. Ninety members were present. Mr. G. Brown Goode, chairman of the Committee on Lectures appointed by the Council, announced that, in co-operation with a similar committee, appointed by the Anthropological Society in response to an invitation from the Council of the Biological Society, a course of lectures had been arranged for; these lectures to be given on consecutive Saturdays, at 3 : 30 P. M., in the lecture room of the National Museum. These lectures were to be free, and the public was to be invited. The discussion of the form of the tail and affinities of the Arctic Sea Cow was resumed; and by special vote, continued until 10 : 30 P. M. The speakers were Messrs. Elliott, Coues, True, and Gill.

FIRST SATURDAY LECTURE, March 11, 1882.

An audience of about six hundred were present on the occasion of the first Saturday lecture.

Prof. Theodore Gill delivered a lecture entitled SCIENTIFIC AND POPULAR VIEWS OF NATURE CONTRASTED.*

The introductory address was delivered by Major J. W. Powell.†

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* 1882. GILL, THEODORE N. Scientific and Popular Views of Nature Contrasted. <The Saturday Lectures, | delivered in the | Lecture Room of the U. S. National Museum, | under the auspices of the | Anthropological and Biological Societies | of Washington, | in March and April, 1882 | — | D. Lothrop & Co., | 30 and 32 Franklin Street, Boston, Mass. | Washington, D. C. :—Judd & Detweiler, Printers and Publishers. | 1882. | 8vo., pp. (4) 185 : (pp. 5–22). Also separately as Saturday Lecture No. 1, with title page, pp. 24.

† 1882. POWELL, JOHN W. Introductory Address (to the Saturday Lectures.) <The Saturday Lectures, pp. 1–3.

TWENTY-SIXTH MEETING, March 17, 1882.

The President occupied the chair. Forty-five members were present.

Dr. Elliott Coues read a paper entitled ON RECENT ADVANCES IN ORNITHOLOGY, on the occasion of laying before the Society, in advance of publication, a complete copy of the work below cited.* Remarks were made by Messrs. Gill, Ward, and Coues.

Dr. Edward Foreman exhibited a map of the Cretaceous fossil beds of Maryland.

SECOND SATURDAY LECTURE, March 18, 1882.

About six hundred persons listened to the lecture of Prof. Otis T. Mason on the topic: WHAT IS ANTHROPOLOGY? †

THIRD SATURDAY LECTURE, March 25, 1882.

An audience of about six hundred persons listened to the lecture by Prof. J. W. Chickering, Jr., on CONTRASTS OF THE APPALACHIAN MOUNTAINS.‡

TWENTY-SEVENTH MEETING, March 31, 1882.

Prof. Lester F. Ward, V. P., occupied the chair. Eighty members were present.

Dr. D. Webster Prentiss read a paper entitled MESMERISM IN

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* 1882. COUES, ELLIOTT. The | Coues Check List | of | North American Birds. | Second Edition, | Revised to Date, and entirely Rewritten, under Direction of the Author, | with a Dictionary of the | Etymology, Orthography, and Orthoepy | of the | Scientific Names, | the Concordance of Previous Lists, and a Catalogue of his | Ornithological Publications. | [Monogram.] | Boston: | Estes and Lauriat. | 1882.—1 vol., imp. 8vo., pp. 1-165.

† 1882. MASON, OTIS T. What is Anthropology? <The Saturday Lectures, &c., pp. 25–43; also separate as Saturday Lecture No. 2. with title page, 8vo., pp. 21.

‡ 1882. CHICKERING, JOHN W., Jr. Contrasts of the Appalachian Mountains. <The Saturday Lectures, &c., pp. 44–59; also separate with title page as Saturday Lecture No. 3, 8vo., 16 pp.

ANIMALS, and at its close mesmerized a canary bird and a fowl. The paper was discussed by Messrs. Schaeffer, Billings, Ellzey, Coues, Wolfley, Riley, True, King, Gilbert and Gihon.

FOURTH SATURDAY LECTURE, April 1, 1882.

About eight hundred persons listened to the lecture of Major J. W. Powell on OUTLINES OF SOCIOLOGY.*

FIFTH SATURDAY LECTURE, April 8th 1882.

About seven hundred and fifty persons listened to the lecture of Prof. C. V. Riley, on LITTLE KNOWN FACTS ABOUT WELL KNOWN ANIMALS.†

TWENTY-EIGHTH MEETING, April 14, 1882.

The President occupied the chair. Sixty-five members were in attendance. Prof. William H. Brewer, of Yale College, was present as a guest.

Dr. Frank Baker proposed amendments to the Constitution as follows:

In ARTICLE III. Strike out the words, "upon recommendation of the majority of the members present at its regular meeting;" and substitute for the words "a majority vote of the members present when the ballot is taken shall be necessary to an election," the words "seven affirmative votes shall be necessary to an election."

In ARTICLE IV. Strike out the words, "its duty shall be to act on nominations," &c., and substitute—"It shall conduct all the business of the Society except the election of officers."

In ARTICLE XII. Strike out sections III, IV and V.

A committee of five, consisting of Messrs. Ward, Goode, Chickering, Riley, and Rathbun, was appointed to confer with the committees appointed by the Anthropological and Philosophical Societies in reference to the proposed scheme for the consolidation of the Scientific Societies of Washington and the formation of an Academy of Sciences and to report the result of their conferences.

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* 1882. POWELL, JOHN W. Outlines of Sociology. <The Saturday Lectures, &c., pp. 60–82, also separate with title page as Saturday Lecture No. 4. 8vo. p. 25.

† 1882. RILEY, CHARLES V. Little Known Facts About Well Known Animals. <The Saturday Lectures, &c. pp. 83–112. Also separate with title page as Saturday Lecture No. 5. 8vo., pp. 32. Fifteen woodcuts.

Dr. Frank Baker read a paper entitled ON THE RAMIFICATIONS OF THE ARTERIES. This was discussed by Messrs. Gill, Barnard, and Scudder.

Mr. G. Brown Goode exhibited several remarkable specimens of taxidermic skill from the work shops of the National Museum.*

SIXTH SATURDAY LECTURE, April 15, 1882.

About six hundred persons listened to the lecture of Dr. Robert Fletcher upon PAUL BROCA AND THE FRENCH SCHOOL OF ANTHROPOLOGY.†

SEVENTH SATURDAY LECTURE, April 22, 1882.

Abot six hundred and fifty persons assembled to hear the lecture by Mr. William H. Dall upon DEEP-SEA EXPLORATIONS.‡ Among the audience was Captain Sir George S. Nares, R. N., late commander of the British corvette "Challenger" during its three years cruise of deep-sea exploration.

TWENTY-NINTH MEETING, April 28, 1882.

The President occupied the chair. Forty-five members were present. The Society voted that the next regular meeting of the Society should be a "Darwin Memorial Meeting." A committee consisting of Messrs. Goode, Riley, Ward, Rathbun, and Gill, having been appointed by the Council to arrange for the same, and having anticipated the action of the Society by making certain preliminary arrangements.

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* See Report of the Assistant Director of the U. S. National Museum. <Report of Smithsonian Institution for 1881.

† 1882. FLETCHER, ROBERT. Paul Broca and the French School of Anthropology. <The Saturday Lectures, &c. pp. 113–142. Also as separate, with title page. 8vo., pp. 32.

‡ 1882. DALL, WILLIAM H. Deep-Sea Explorations. <The Saturday Lectures, &c. pp. 143–162. Also separate, with title page, as Saturday Lecture No. 7. 8vo., pp. 22.

Mr. Edmund B. Wilson, of Johns Hopkins University, a corresponding member, presented a paper on THE EMBRYOLOGY OF RENILLA.*

Mr. Frank H. Cushing spoke on the topic ZUÑI BIOLOGY, describing some of the peculiar plants and animals occurring in the deserts of the Southwest, and referring to the manner in which animals are regarded by the Zuñi Indians.

EIGHTH SATURDAY LECTURE, April 29, 1882.

About six hundred persons listened to the lecture of Dr. Swan M. Burnett upon the topic HOW WE SEE.†

SPECIAL MEETING, May 5, 1882.

The President occupied the chair. Thirty-eight members were present.

Mr. Goode presented the report of the Committee on the Darwin Memorial Meeting, which was accepted. Prof. Ward submitted the report of the Committee on the Consolidation of the Scientific Societies in Washington, as follows:

The joint committee composed of the several committees appointed by the Philosophical, Anthropological, and Biological Societies of Washington to consider the desirability of a federation of those societies—

Recommend to the several societies a federation on the following basis, and for the purposes set forth:

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* The remarks of Mr. Wilson were in part included in the following papers:

1880. WILSON, EDMUND B. The Early Stages of Renilla. <American Journal of Science, XX, 1880, pp. 446–9, plate VII.

1882. WILSON, EDMUND B. On Animal Polymorphism. <Johns Hopkins University Circulars, No. 15, May, 1882, pp. 203–4.

† 1882. BURNETT, SWAN M. How We See. <The Saturday Lectures, &c. pp. 163–185. Also separate, with title page. 8vo., pp. 25. Three woodcuts.

I. The purposes of this federation shall be—
First, the publication of a common body of transactions;
Second, periodic meetings of the united societies;
Third, the management of courses of popular lectures; and,
Fourth, such other objects as may be agreed upon.

II. The federation shall be known as the Washington Academy of Sciences.

III. The several societies shall retain their own organizations, excepting as hereinafter modified.

IV. The three societies shall have the same annual fees of membership.

V. The uniform fee for each of the three societies shall be three dollars.

VI. The Academy shall be organized by the election of a president, a secretary, a treasurer, and two councilmen, by the Academy. The presidents of the several societies shall be *ex officio* vice presidents of the Academy, and members of its council, one secretary from each society shall be a member of the council, and each society shall elect two additional councillors for the council of the Academy.

VII. A grade of fellowship shall be established in the Academy.

VIII. The annual fee of fellowship shall be five dollars.

IX. The existing members of all the societies shall be fellows of the Academy, on the payment of the fellowship fee.

X. The council of the Academy may subsequently elect fellows from the members of the Academy.

XI. The fellows of the Academy shall be *ex officio* members of all the societies.

XII. It is recommended to the several societies that the existing committees of conference be continued, for the purpose of collecting the sense of the said societies on the above propositions, and of carrying out such scheme of organization as may be mutually accepted.

WILLIAM B. TAYLOR,
Chairman of Joint Committee.

Committee of Philosophical Society.—John W. Powell, Theodore Gill, James C. Welling, John S. Billings, William B. Taylor.

Committee of Biological Society.—Lester F. Ward, G. Brown Goode, Charles V. Riley, Richard Rathbun, John W. Chickering.

Committee of Anthropological Society.—John W. Powell, Garrick Mallery, James C. Welling.

Mr. Goode submitted the following table of statistics, showing the comparative membership in the three societies:

Total membership in the three Societies		329
Membership in Philosophical Society		160
"	Anthropological Society	115
"	Biological Society	134
Common to all		22
"	Philosophical and Anthropological Societies	32
"	Philosophical and Biological Societies	38
Anthropological and Biological Societies		36
Members of Philosophical Society only		97
"	Anthropological Society only	61
"	Biological Society only	20

The reports of the committee were discussed by Messrs. Wilson, Bean, True, Riley, Kidder, Seaman, and Ellzey, a strong feeling of opposition to any scheme of consolidation being manifest. The motion of Prof. Riley, "*Resolved*, That it is the sense of this (informal) meeting that a federation with the Anthropological and Biological Societies is desirable," was carried by a vote of 22 to 8. The first six articles of the report of the committee were provisionally approved one by one, and the committee was continued, with instructions to report further action at a regular meeting of the Society.

THIRTIETH MEETING, May 12, 1882.

DARWIN MEMORIAL MEETING.

The President occupied the chair. In addition to the members of the Society, the members of the other societies and their friends had been invited to attend; and although the night was stormy, about seven hundred ladies and gentlemen were present to attend the memorial service in honor of Charles Darwin, who died at Down, Kent, England, April 19, 1882. On the stage sat, in addition to the officers of the Society, Dr. W. B. Taylor, President of the Philosophical Society; Major J. W. Powell, President, Dr. Robert Fletcher and Prof. O. T. Mason, Vice-Presidents, and Col. F. A. Seely, Secretary, of the Anthropological Society. A large portrait of Darwin, painted by Henry Ulke, V. P., and a bust, by Mrs. Mica Heideman, decorated the stage. The order of exercises was as follows:

Introductory	Theodore Gill.
Biographical Sketch	Wm. H. Dall.
The Philosophic Bearings of Darwinism	John W. Powell.

Darwin's Coral Island Studies	Richard Rathbun.*
Darwin's Investigations on the Relation of Plants and Insects	Charles V. Riley.
Darwin as a Botanist	Lester F. Ward.
Darwin on Emotional Expression	Frank Baker.
A Darwinian Bibliography	Frederick W. True.
A Portrait of Darwin	Henry Ulke.

The addresses delivered on this occasion are printed in full in the appendix.

THIRTY-FIRST MEETING, May 26, 1882.

The President occupied the chair. Thirty-five members were present.

Mr. Wm. H. Dall made an appeal for aid in the exploration of the molluscan fauna of the District of Columbia.

Dr. Tarleton H. Bean exhibited a specimen of a rare arctic bird, the Spoon-billed Sandpiper, *Eurynorhynchus pygmæus*, obtained by him on the coast of Siberia.†

Dr. M. G. Ellzey made a brief communication upon the natural history of mules.

The Society ratified the action of the council in voting that the proceedings of the Society, together with the addresses at the Darwin Memorial Meeting, should be printed, and that the funds of the Society now in the treasury should be used for that purpose. A resolution to the effect that women should be admitted to membership in the Society was referred to a committee consisting of Gen. William Birney, Messrs. Dall and Goode, and Doctors Prentiss and Kidder.

The Society then adjourned to meet in October.

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* Omitted on account of the illness of Mr. Rathbun.

† 1882. BEAN, TARLETON H. Notes on Birds collected during the summer of 1880, in Alaska and Siberia. <Proc. U. S. Mus., V, 1882, pp. 144+ (*E. pygmæus*, p. 165.)

Also, 1881. BEAN, TARLETON H. Our unique Spoon-billed Sandpiper. <Forest and Stream, XVI, April 12, 1881.

ADDRESSES

DELIVERED ON THE OCCASION OF THE

DARWIN MEMORIAL MEETING,

HELD IN THE LECTURE-ROOM OF THE U. S. NATIONAL MUSEUM,

MAY 12, 1882.

THE DOCTRINE OF DARWIN.*

By Theodore Gill.

The chief for many years of the leaders in science knows no longer the world he erstwhile knew so well. Charles Darwin has closed a life illustrious in the annals of biology, scarce full of years but very full of honors.

How fruitful was that life and how potent its influence on philosophy and on sociology the united voice of the civilized world proclaims—how grievous the loss the lamentations of mankind testify. Less than a quarter of a century has elapsed since the publication of the "Origin of Species by means of Natural Selection." How great is the contrast between the beliefs and practice of naturalists before its appearance and those of their present successors! He would, indeed, have been a bold man who would have predicted that, in two decades after its appearance, the views therein promulgated would be universally accepted and be taken as the recognized platform of biologists. But the incredible has actually happened; all the students of nature, and in every land; zoologists and botanists, palæontologists and geologists—in America and Europe, at the confines of Asia, the extreme of Africa, and in distant Australia—all meet on common ground as evolutionists; all recognize to a greater or less extent the operation of natural selection in the survival of the fittest. To appreciate the cause of the profound impression produced by the deceased naturalist's greatest work, some reference to the antecedent and succeeding conditions is fitting.

It had been, from time immemorial, a generally accepted idea that the living beings which people the globe had, in some mysterious manner, been each "created" separately; but how, few ventured to express in words, for the mere attempt to do so conjured up such strange fancies that the intelligent mind drew back in revolt and refused to consider them. Now, it is a recognized scientific creed that the animals and plants which have successively inhabited the earth, were the descendants, with modification, from previous inhabitants since the dawn of life. A glimmer of the truth had now and then occurred to contemplative students. Philosophers had ventured to think that living forms like ancient ones might have descended from them. The investigators in various departments of biology had gradually deduced generalizations which all tended in a similar direction. The taxologists, in their very nomenclature, compared the animal kingdom to a tree of which the principal types were "branches" diverging from a common trunk, while the minor groups were successive offshoots; and the idea of genetic relationship suggested by the various degrees of likeness was expressed in the names conferred on other groups—"tribe," "family," etc. The embryologists had recognized a coincidence between the stages of development of the "superior" animals and the adults of animals inferior in the system. The palæontologists had discovered an approximate coincidence between the successive inhabitants of the earth and the successive stages in the development of the living animals of the same types. The series of facts thus obtained had even, to some extent, been coordinated.

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* Several of the paragraphs in this address were published in advance, with a few modifications, in "The Critic," of New York, for May 6, 1882.

All these series of facts were such as would have been the result of the derivation of existing types from previous ones. But the possibility that the seeming was the real did not commend itself to the consideration of naturalists. Instead thereof, it was assumed that the facts were "in accordance with a plan of the Creator;" that the Deity had conceived a few patterns, and that by those he constructed the animals which successively appeared on the globe, to be in time swept off and replaced by others. If answer was made that such was a puerile conception of creation and that it limited the power of Deity, excessive anger was displayed, and its opponents called infidels and atheists. But even those who doubted whether the accepted views of creation were tenable, hesitated to take the alternative view. An efficient factor in variation remained to be discovered, and a full presentation of the data had yet to be made.

It was in 1859 that the desiderata indicated were supplied in "The Origin of Species by means of Natural Selection." "Variation under Domestication" was compared and contrasted with "Variation under Nature." The "Struggle for Existence" which is the result of the progressive increase of living beings was considered, and "Natural Selection" was designated as the factor which determined the development and existence as "species" of forms which had descended, with modifications, from countless antecedent generations. With the successive changes in temperature and other conditions ensuing in the ever-changing world, the animals and plants which peopled it were compelled to keep pace by corresponding changes in structure, or to give place to others who could adapt themselves to the new conditions.

So much were the views thus enunciated opposed to the current ideas that a brief period of astonished silence ensued, and men felt about before they could realize their full purport, or that such opinions were broached in sober earnest. Then followed on every hand torrents of detraction and abuse. The naturalists of the old school and the priests of revelation met on common ground, and loud and bitter was the denunciation. Numerous were the arguments against the new theory.

But why this great turmoil and uproar? Darwin was not the first to believe that species had been derived and not created. So had philosophers believed before; the grandfather of Darwin believed and urged the belief; a great naturalist at the commencement of the century—Lamarck—boldly and wisely formulated a theory of evolution; the "Vestiges of Creation" took up the view, and gained marked attention in Britain. Even a clergyman of the English

Church, the Savilian professor in orthodox Oxford, the Rev. Baden Powell, in 1855, had considered the "Philosophy of Creation" in a "masterly manner," and Darwin bore testimony that nothing can be more striking than the manner in which the enlightened priest showed that the introduction of new species is a regular phenomenon in contradistinction to a miraculous process. Darwin was not the first even to conceive of the principle of natural selection. An American resident in England, Dr. W. C. Wells, as early as 1813, had recognized the operation of the principle in the distribution of the human race. In 1831, Patrick Matthews also appreciated the principle of natural selection; so Darwin himself witnesses.

It was not, then, the mere enunciation of the theory of evolution, nor of the principle of natural selection, that characterized the "Origin of Species," and drew the attention of mankind to it. It was the recognition of the incessant and universal operation of the factors, the masterly co-ordination of the facts of biology—zoology, botany, anatomy, general morphology, physiology, embryology, palæontology—and geology, the marshalling in orderly array and concentration in one direction of all natural knowledge, the force of the logic, the clearness of the exposition, the judicial candor of the argument that arrested men's attention, and provoked serious consideration of what before had been ignored as being beyond the domain or possibilities of investigation. In the time of Lamarck the world was not ready for a consideration of the question. Lamarck's was the prophesy of intuitive genius—genius the greater in that the facts that had then been garnered were few. The "Vestiges of Creation" was so replete with errors of fact and misconceptions as to attract more attention to the fault of its details that to the logic of its argument. The principle of natural selection had been applied to very special fields by Wells and Matthews; no evidence had been furnished of its wide extension, and it even occupied a subordinate position in the thoughts of those investigators.

The author of the "Origin of Species" was a different man from his predecessors, and lived in a happier time. The facts had been accumulated and co-ordinated; men were ready to consider the reason why facts were such, and none was better fitted than Darwin —I should rather say none was so well fitted—to arrange and present the facts and to draw the deductions therefrom. Ever a close observer, practiced in many lands, student of all nature—especially skilled as a geologist, a botanist, and a zoologist—endowed with a severely judicial mind, honest above all, none like him had ever grappled with the mystery of creation. For more than twenty years he had pondered on the subject; with impartial severity he had weighed the evidence. He was, perforce, led to the conclusion that all the living had been derived from past forms, with modifications incident to individuality; the sums of the divergencies, small in themselves, became large in the aggregate, became enormous in time. The increasing beings, crowding upon each other, invading each other's domains, struggled for the life into which they were born. Happy were those possessing some slight advantage—strength, swiftness, dexterity, or adaptability resulting from modification of structure—for they could procure place or food at the expense of their competitors, and the characters that gave them victory secured, likewise, the temporary ascendancy of their kind. How great is this variability our domesticated animals attest; how ancient is our globe geology teaches; that the race is to the strong or the cunning observation of inferior nature assures. With known variability, time, and space, what could not result? Which, then, was the more probable that Nature—or, if you will, the Creator—had always operated under law, or that there had been constant interference?

Thus were the issues fairly joined. On the one hand, Creation was the rallying cry; on the other, Evolution and Darwin. But what meant the opposed terms? It is surely but reasonable to ask the question. The evolutionists conceded the reasonableness, and gladly accepted the ordeal. Could less be required of the creationists? In reverential mood would I submit the alternatives. If they repel, blame not me. I have long and fruitlessly searched for better.

Creation implies the actual fashioning of forms in full panoply, and with all the characteristics of their kind. But when it was asked how this had been effected the answer was vague and evasive. Did "elemental atoms flash into living tissues?" Was there vacant space one moment and an elephant apparent the next? Or did a laborious God mould out of gathered earth a body to then endue with life? The questions are surely pertinent, for only by such means can we conceive of creation. But passionate disclaimers and angry denunciations greeted him who would frame such conceptions in exact language. Metaphysical jargon and rhetoric about divine purposes might sophisticate, but could not answer.

Evolution denotes the derivation of living beings from preceding in endless succession. Variation in progeny, limited heredity, and time are its correlatives. These being conceded, the peopling of the globe with its life, past and present, is conceivable.

What was the evidence to support the conflicting conceptions?

For creation it was urged that the universal consensus of mankind supported it; that divine revelation taught it; and that the diversities and specialization of organic forms forbade the idea of their derivation from a common parentage.

The universal consensus of mankind maintained till the sixteenth century the doctrine that the earth was flat; that the sun and other planets circled round the earth; and that the earth was the great centre of the universe. The universal consensus of mankind for thousands of years is not the universal concensus of the enlightened man, nor of the present century.

The teachers of revelation have been often mistaken. Many are they who once were contemned and denounced because their utterances were not in accordance with the opinions of their day, who are now accepted as the champions of a purer religion. One of the wisest priests of England has said that "with a certain class of religionists every invention and discovery is considered impious and unscriptural as long as it is new. Not only the discoveries of astronomy and geology, but steam, gas, electricity, political economy, have all in their turn been denounced; and not least, chloroform. Its use in parturition has been anathematized as an infraction of the penalty pronounced on Eve!"* It is not I, but a great clergyman, who expresses such sentiments.

The objection that the differentation and specialization of organic beings gainsay their derivation from a common source is a most weighty one. In the infancy of our own knowledge it was unanswerable, and the less we know of nature the more we are impressed with these diversities. It is not, however, simply a question of whether evolution is true; but which is the more probable of two alternatives—that all the phenomena which point in one direction and which could have occurred in natural sequence, have taken place in such sequence; or that direct creative intervention has ensued again and again, when the same ends could have been produced without such intervention.

Nature was true to her disciple, and herself furnished the replies.

It was contended that if evolution were true, the evidence should be forthcoming in the existence in previous geological epochs of forms of a generalized character intermediate between still earlier ones and later widely separated forms; and that of such there were very few.

The graves of the distant past gave up their dead, and the ossuaries of our own far West yielded most cogent testimony to the truth. Forms from the eocene and later beds, resurrected by the wand of the anatomist, rising in successive lines behind the wide gaps in the living files, proclaimed that all were of one blood, and showed the genealogy of the contemporaries of man.

Many were the forms thus connected. Few are those that may be mentioned on this occasion. The horse-like animals, the rhinoceroses, and tapirs are so unlike, that proof of their derivation from one source might be thought to be impossible. But as we go back into the ages we find equines with lateral digits and hooflets becoming larger and longer, teeth shorter and more generalized, skeletons less characteristic; rhinoceroses with cutting teeth, and more slender forms; tapir-like animals without the peculiar tapirine teeth, with rhinocerotoid skulls, and with otherwise modified structure; all these accompanied by innumerable other modifications, till finally we are almost at a loss to tell whether it is a horse-like, a rhinocerotoid or a tapiroid animal that is before us, and *they* become lost in earlier forms with special characters of their own. And as we go still further back we are confronted with still other forms that are connected by series projected backward from the ruminants and from the elephantids. We do, in fine, know the genealogy of our own contemporaries—imperfectly it is true, but still we know it.

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*Rev. Baden Powell's Essay on the Spirit of the Inductive Philosophy, etc., p. 455.

It was objected that animals were segregated by such very wide intervals that they must be isolated in different branches, and that there could be no community of structure between such branches; they expressed fundamentally different plans of structure.

One by one zoology, anatomy, and embryology supplied the links between the old branches; the branches were at length completely uprooted, and it has even become a matter of simple convention what should be considered major groups. Plans of structure can no longer be claimed to be peculiar to different types.

That branch of which man is the primate—the vertebrates—was supposed to be perfectly unassailable and isolated; but zoology and anatomy have revealed to us amphioxus, and embryology the earlier stages of the tunicates. The evidence is now conclusive that these forms which once appeared to be among the most distant are now the most closely related. The affinities of the tunicates with invertebrates are evident, and thus we may look far back to that time when vertebrates did not exist, but when the common ancestors, from which they and the related invertebrates should diverge, held sway.

It was even pretended that the evidence was insufficient to show that variation was possible or could be propagated.

From every hand testimony was forthcoming. The breeder could point to every domesticated animal—the horticulturist and pomologist to all cultivated plants—the systematist and zoögeographer to the limits of species which varied with knowledge of their distribution—the palæontologist to the gradation between the extinct forms and widely separated living species, as well as to that between forms which lived in successive earlier epochs.

It was urged that the Darwinian theory was opposed to revelation, and subversive of Christianity.

As students of nature and seekers after truth alone—so far as nature is concerned—we only ask whether the views of Darwin are true or not. But now, from many a pulpit, and from the most enlightened of the clergy, we hear the claim that evolution is in perfect accordance with revelation, and is a witness to the power, prescience, and goodness of God.

It was contended that acceptance of the teachings of Darwin would have a pernicious tendency, and entail riot, lawlessness, and crime in the world.

A long life of singular purity and blamelessness in the person of Darwin was an answer. An unsullied heritage from an ancestor entertaining like views has been transmitted to heirs of his body without flaw. Sons of the great philosopher continue the studies of their great sire, and worthily wear the heavy mantle left to them.

One after another the scientific opponents of evolution became convinced of its verity, or died out. The naturalists of a new generation with one accord accepted "Darwinism" as a starting point for their more profound studies. The methods and aims of biology became changed. Biology became exalted from empiricism into a science. Long before "The Origin of Species" had even "come of age," acceptance of its teachings had become an essential of scientific creed, and Darwin was acknowledged to have effected a greater revolution in science than any Englishman since the time of Newton. Most meet was it then that he should rest by the side of his great predecessor whose rival he will ever be in fame.

BIOGRAPHICAL SKETCH.

By William H. Dall.

Charles Robert Darwin, son of Dr. Robert Waring Darwin, F. R. S., and Emma Wedgewood, grandson of Dr. Erasmus Darwin and Josiah Wedgewood, was born at Shrewsbury, England, February 12th, 1809. He died of disease of the heart at his residence, Downe Court, Beckenham, Kent, at 4 P. M., April 19, 1882, and consequently had attained the age of 73 years, 2 months, and 7 days. At Shrewsbury his childhood was passed and his education was obtained at the once famous Shrewsbury Grammar School, presided over by the Rev. Dr. Samuel Butler, afterward Bishop of Litchfield and Coventry.

At the age of sixteen he entered the University of Edinburgh (1825) where he remained two years. Even at this early period he had become a student of natural history, and read his first scientific paper before the Plinian Society. It was "On the Movement of the Ova of Flustra," one of the incrusting marine corallines.

In 1827 he entered Christ's College, Cambridge, where he graduated as a Bachelor of Arts four years later. Here he fell under the influence of the teachings of Prof. John Stevens Henslow, an excellent botanist, whose instruction doubtless did much to determine the field of study subsequently occupied by his pupil.

In 1831 Captain Fitzroy, R. N., offered to share his cabin with any competent naturalist who would accompany him on his prospecting voyage to South America in H. M. S. Beagle, detailed for surveys in that region. Mr. Darwin, then only twenty-two years of age, offered his services with the stipulation that he should control the collections made, and was accepted. The Beagle sailed November 27, 1831, from Plymouth, and returned to England on the 2d of October, 1836. During a large part of the voyage Mr. Darwin suffered greatly from sea-sickness, or some difficulty which simulated it, and which, in some form, returned at intervals throughout his whole life, as sudden fits of illness which prostrated him for days together, and which were followed by long periods of wakeful convalescence. Under the circumstances, the amount of keen and patient observation, the vast accumulation of facts, and the extensive collections obtained by Mr. Darwin during his voyage, appear more marvelous than ever.

After his return his health was much shattered, and his studies more or less interrupted for some years. He took his Master's degree in course, and shortly after his return was elected a Fellow of the Royal Society, (of which his father and grandfather were previously Fellows,) and of the Geological Society, of which last he was made secretary.

In 1839 he published his epoch-making work "A Journal of Researches into the Geology and Natural History of the Various Countries visited by H. M. S. Beagle;" the first of that long series of investigations to which his life was devoted, and the publication of which revolutionized the study of biology, and gave to Darwin a position as a naturalist unparalleled in the history of science.

In the same year, 1839, Mr. Darwin married his cousin, Emma Wedgewood, and retired to the secluded and beautiful district of Kent where, in his country-house of Downe Court, near Orpington, more than forty years of his life were spent. The district is purely agricultural, a plateau of chalk, some 400 feet above the sea, interrupted by the wavy hollows characteristic of the English chalk country, with beech woods here and there on the slopes. His dwelling is one of the old square-built, red-brick mansions of the last century, to which has been added in more recent times a gable-fronted wing, with another square-built wing and pillared portico on the corresponding side. Shut in and almost hidden from the roadway by a high wall and belt of trees it offers ideal seclusion for a quiet student. On the southern side the walled garden opens into a secluded meadow bounded by a tract of underwood through which there is a lovely view of the narrow valley which descends toward Westerham.

Here, and in the by-paths of adjacent woods and meadows, Mr. Darwin was accustomed to take daily exercise with a characteristic regularity. Up to ten or twelve years ago, his tall figure, mounted on a favorite old black horse, was a familiar object in the country lanes. This animal fell and died suddenly one day, after which it was noted that Mr. Darwin rode no more. His invariable hours for walking, in these later years, were seven in the morning, noon, and four o'clock in the afternoon, usually accompanied by one or more of his sons; one of whom, Mr. Francis Darwin, has long been established as a surgeon in the hamlet of Downe. His habits were extremely regular. He rose at six, took a cold plunge bath (which was repeated in the evening), breakfasted alone, and after his first morning walk was usually in his library by 8 A. M. At nine he would spend a little time in the dining-room opening his mail, and in the evening would linger an hour or two in the society of his family, or that of some of his scientific friends who occasionally visited him; but the greater part of his time was spent in his library, his garden, and the adjacent grounds. A few friends, among whom were Sir John Lubbock and Dr. Farr, near residents, were often with him, and with such he was social, frank and ever ready to enjoy a joke or frolic; with all men he was unpretentious, kind, and devoid of any artificiality of manner; but his life was essentially a secluded one, as may be judged from the fact that the news of his death did not reach London until noon of the following day.

Nevertheless, his life was far from solitary, for his family formed quite a colony in itself until the children reached maturity. Two children, a boy and girl, were lost in infancy, one dying in 1842 and the other in 1858, and are buried in the village churchyard of Downe, near by some of the Wedgewoods.

In the family who lived Mr. Darwin was fortunate. His eldest son, William, is a banker at Southampton; the second, George, took high honors at Cambridge, and is now a Fellow of Trinity College and a distinguished mathematician; the third, Frank, having inherited his father's delicate constitution, acted as his secretary; the fourth, Leonard, an officer of artillery, has distinguished himself in the direction of astronomy; the fifth, Horace, is an excellent mathematician. One married and one unmarried daughter complete a family whose constant care has always been to relieve its head from any trouble and anxiety.

Mr. Darwin has always been in easy circumstances, financially, so that he could use his time as he chose, without care. When young he pursued field-sports, with the combined interest of the hunter and the naturalist; in later years he found his chief relaxation in reading popular novels. His work was taken up with great method, and he never wrote for more than two hours at a time.

In 1853 he received the gold medal of the Royal Society for his various works; in 1859 that known as the Wollaston medal from the Geological Society; in 1871 he received the Prussian Order of Knighthood "For Merit," and was elected a corresponding member of the Austrian Academy of Sciences; and in 1878, foreign associate of the French Academy. He received honorary degrees from Leyden and Cambridge, and other scientific honors almost without number.

His death was unexpected. He had been slightly unwell for several weeks, and the weakness of the heart's action was such that he was not permitted to ascend the stairs, but in the main, he was still able to pursue his ordinary routine. On Tuesday morning Sir John Lubbock found him apparently about as usual. That he was seriously ill, was first known in the village Wednesday afternoon by the arrival of his groom on horseback, horse and man reeking with foam, having galloped for ice six miles and back from the nearest point where it could be procured; but in vain, the relief arrived too late, Charles Darwin had already passed away, surrounded by his family, including several of his sons, Mrs. Darwin, and a married daughter. On the 26th his mortal remains were laid in Westminster Abbey, near by the ashes of Isaac Newton, and were followed to the tomb, not only by dignitaries of Church and State, but by the universal reverence of the scientific world.*

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*It is hardly necssary to state that this sketch is a compilation from all the different sources which happened to be available at the time.

DARWIN'S CONTRIBUTIONS TO PHILOSOPHY.

By John W. Powell.

Many are the definitions of philosophy. If we wish not to define what is *true* philosophy, but simply to define the term in all its uses when referring to all times and all men, this definition will do: *Philosophy is the explanation of the phenomena of the universe.*

Now, the phenomena of the universe are embraced in many vast categories.

First, we have the constitution of the heavenly bodies, and their real and apparent motions to be explained. What are they, and how came they to be what they are?

Then we have the earth itself; its forms, its lands and seas, its mountains and valleys, its rivers and lakes, the winds which blow about it, the storms which fall upon it, the lightnings that flash athwart the sky, the thunders that roll among the clouds. What are all these things, and whence came they, and why are they? Again, in the constitution of the earth we find rocks with their minerals, and geologic formations with their fossils. What are rocks and minerals, formations and fossils, and whence came they?

Look at the innumerable forms of plants covering the earth with verdure—the whole vegetable kingdom on the land and on the sea; forests, mosses, and confervæ. Who shall explain the meaning of the phenomena of the vegetable kingdom?

The oceans teem with animal life; reptiles crawl over all the land; the hills and the valleys, the mountains and the plains, are all inhabited by beasts; and the air itself is populated. Who shall tell us of all the living things, and then explain life itself?

Turn to the contemplation of man, organized into tribes and nations; man possessed of innumerable languages; man engaged in arts and industries; man endowed with reason and will; man in search of moral principles to guide his conduct. Whence came this man, and whither does he go?

Among all tribes and nations of the globe, and in all times, men have sought to discover the whence, the how, and the why, of all things—the phenomena of the universe.

The explanation of the universe is philosophy.

The philosophies of the world may be classified as—

I. Mythologic.
II. Metaphysic.
III. Scientific.

Mythology and science constitute the two grand systems of philosophy, but between them stands metaphysic philosophy as a stepping-stone from the former to the latter.

In the lower stages of society philosophy is purely mythologic. All savage and barbaric peoples explain the phenomena of the universe by a system of myths. A mythology is always a growth, and among every people there grows up by the employment of diverse and superficial analogies—curious suggestions—a body of mythic explanations which constitute its philosophy.

Among the Wintuns of California the world is three-storied. There is a world—a great chamber—above, and there is this world, and a world below. The waters fall from the world above because the sky, the floor of that upper world, leaks; and the waters come from the world below through the springs that issue from the flanks of the dead volcanoes of that land; so the waters from above and the waters from below meet and flow down the great Sacramento to the sea, where again they divide; the waters from above taking their way to their upper home, and the waters from below taking their way to the lower world.

The mountains were formed by the great mole-god, who crawled under the land and upheaved the mountain ranges that stand on either side of the Sacramento Valley. And so they explain all of the phenomena of the universe, with which they are acquainted, in a system of myths which constitutes the philosophy of the Wintuns.

Now such a system of philosophy, a mythology, is found in every savage and barbaric tribe of the world.

But there came a time in the history of mankind when some of the peoples changed their philosophy—their explanation of the phenomena of the universe—by changing their methods of reasoning.

ORIGIN OF METAPHYSIC PHILOSOPHY.

From three to two thousand years ago Europe, Asia, and Africa established a commerce in ideas—an exchange in philosophies—carried on by the navigation of the Mediterranean. During that and some previous time there were built on the shores of this sea many cities. Through the building of these cities, and through the industries and arts which sprang up therewith, society was reorganized, and placed upon a new basis—tribal society developed into national society—barbarism into civilization.

The peoples of these cities spoke diverse languages, and entertained diverse mythologic philosophies. Through the intercourse which sprang up between them each learned of the philosophy of the other, and the scholars of that day attempted to discover in all of these diverse mythologies a common body of truth upon the theory then widely accepted, that they had all sprung from a common source—a primitive philosophy itself the truth—and that all the philosophies then existing were degenerations therefrom. This line of investigation led to a curious result.

All of the mythologies of the cities of the Mediterranean were found to be baseless—each a fabric of poetic but superficial analogies. In the mental activity of that time many new philosophies were proposed, diverse and contradictory, and the wisest philosophers said, "How shall we know the truth?" And they endeavored to discover some criterion by which truth should be known. This resulted in the development of *formal logic* as a testing machine into which opinions were put for the purpose of sifting truth from error.

Now the machine called logic, the tool of the metaphysician, is curiously constructed. Its chief hypothesis is that man was primitively endowed with fundamental principles as a basis of reasoning, and that these principles can be formulated. These fundamental principles are supposed to be universal, and to be everywhere accepted by mankind as self-evident propositions of the highest order, and of the broadest generalization. These fundamental propositions were called *major* propositions. The machine, in formal logic, was a verbal juxtaposition of propositions with the major propositions at the head, followed by the minor propositions, and from this truth was supposed to flow.

This formal logic of the Aristotelian epoch has lived from that period to the period of science. Logic is the instrument of metaphysics, and metaphysic philosophy, in its multifarious forms, is the product of logic. But during all that time—2,000 years—no truth has been discovered, no error has been detected by the use of the logical machine. Its fundamental assumption is false.

It has been discovered that man is not endowed with a body of major propositions. It is found that in the course of the evolution of mind minor propositions are discovered first, and major propositions are reached only by the combination of minor propositions; that always in the search for truth the minor proposition comes first, and that no major proposition can ever be accepted until the minor propositions included therein have been demonstrated.

The error in the metaphysic philosophy was the assumption that the great truths were already known by mankind, and that by the proper use of the logical machine all minor truths could be discovered, and all errors eliminated from philosophy. As metaphysic methods of reasoning were wrong, metaphysic philosophies were false; the body of metaphysic philosophy is a phantasmagoria.

THE ORIGIN OF SCIENTIFIC PHILOSOPHY.

While metaphysic philosophers have been playing with their logical kaleidoscopes, another body of philosophers have been at work gathering the materials for the philosophy of science. Their method is to collect facts and to discover their relations, and they accept no conclusions that are not reached by this method. All other conclusions they hold as undetermined or indeterminate.

And now must be given a definition of science. *Science is the discernment, discrimination, and classification of facts, and the discovery of their relations of sequence.* This is a simple statement, but for its full comprehension a little illustration may be necessary.

A savage hears the voice of his fellow-man, he hears the voice of the beast, and of the bird; he also hears the noise of the thunder, and he supposes that the noise is a voice. In these cases he *discerns* noises, but he does not *discriminate* one noise from the other, and supposes them all to be voices, and that the noise of the thunder is the voice of the Thunder Bird. To understand facts we must not only discern, but discriminate.

The next step in the progress of science is classification. Having discerned and discriminated facts, they must be classified—all those of like nature thrown together. All noises made by living beings for conveying intelligence may be grouped into one class and called voices; all noises made by explosions grouped in another class; and so, as we go on discerning, discriminating, and classifying, we collect the materials of philosophy.

But this is not all of philosophy. Facts have genetic relations. If one thing is done something else will follow, and the highest function of scientific philosophy is to discover the order of succession of phenomena—how phenomena follow phenomena in endless procession, how every fact has had its antecedent fact, and every fact must have its consequent fact. This part of science is called *evolution,* and by this expression scientific men mean to be understood that phenomena go on in endless consequences, and that every act has been preceded by some other act, and that every act will be followed by some other act; that the causes of all of the phenomena of the universe that we wish to explain in a system of philosophy run back into the infinite past; that the consequences of all of the phenomena which we may now observe in the universe will run on into the infinite future. This is evolution.

The statement now given of the three great systems of philosophy is perhaps sufficient for our purposes this evening, and it remains for us to point out the part contributed to scientific philosophy by Darwin, whom we mourn to-night.

When Darwin rose as a light in the scientific world, scientific philosophers had already discovered that the philosophic method of research should include the discernment, discrimination, and classification of facts. At that time the scientific men of the world were engaged chiefly in the collection and arrangement of facts. To some extent they were engaged in discovering their relations of sequence. Important and interesting sequences had been discovered in the vast realm of astronomy; other interesting sequences of facts had been discovered in the realm of geology; some interesting sequences of facts had been discovered in the realm of human history. In the realm of biology, in plant and animal life, the order of succession of facts, the method of evolution, had not been discovered; yet many men were thinking on this subject, many men searching for the method and course of biologic evolution. The facts relating thereto were partly known, and the course and laws of biologic evolution were dimly discerned.

It remained for Darwin to demonstrate the laws of biologic evolution, and the course of the progress of life upon the globe. This he has done in a manner so masterly that there lives not in the world a working biologist, a scientific man engaged in this field of research, who has not directly or indirectly accepted his great conclusions, and the larger body of biologists have accepted them directly.

Let us now go back to the statement that prior to the time of Darwin, scientific men engaged in researches relating to vegetal and animal life were occupied chiefly in the discernment, discrimination, and classification of facts.

Botanists and zoölogists were engaged in describing species, and classifying species, and this did not always enlist the highest talent: and naturalists had become wearied with discussions over minute differences and obscure resemblances, the origin and meaning of which were not understood.

The discovery, largely made by Darwin, of the laws of succession, or genesis, gave to this department of scientific research a wonderful impetus, and since that day thousands of men have sprung up throughout the civilized world to take part in biologic research.

In this field the greatest talent of the latest time is absorbed. The philosophy of biology satisfies the reason. In the universe of life, system is discovered, and biologists see visions of the origin of living beings and dream dreams of the destiny of living beings.

Had philosophers discovered that the generations of living beings were degenerating they would have discovered despair. Had they discovered that life moves by steps of generations in endless circles—that what has been is, and what is shall be, and there is no progress, the gift of science to man would have been worthless.

The revelation of science is this: Every generation in life is a step in progress to a higher and fuller life; science has discovered *hope*.

Darwin demonstrated what others vaguely believed or dimly saw: The course and methods of biologic evolution. Darwin gave hope to philosophy.

The universe of phenomena may be classed in three great categories.

I. Physical.
II. Biologic.
III. Anthropologic.

Physical phenomena may be thrown into three categories: 1. Molar or mechanical physics; 2. Stellar or astronomical physics; 3. Molecular physics.

Biologic phenomena may be classed as: 1. Vegetal; 2. Animal.

Anthropologic phenomena may be classed as: 1. Sociologic; 2. Philologic; 3. Philosophic; 4. Psychologic.

To the discovery of the methods and course of physical evolution, *i. e.*, the order of succession in physical phenomena, many great men have contributed. Among these, Newton stands pre-eminent.

The discovery of biologic evolution, *i. e.*, the succession of phenomena in vegetal and animal life, is in like manner due to the researches of many men, but among these Darwin stands pre-eminent. By his discoveries the discoveries of all other biologists have been correlated and woven into systematic philosophy. The methods and course of anthropologic evolution have yet to be systematized. Important discoveries have been made, but this portion of philosophy is yet inchoate.

WORKING HYPOTHESES.

But Darwin's investigations have not ended research or completed philosophy. He brought scientific men to the frontiers of truth, and showed them a path across the border. Yet more than this he did. He pointed out one of the fundamental methods of research. Before his time philosophers talked about deductive methods and inductive methods. Darwin has taught us that both are fruitless.

Deductive methods are the logical or metaphysical methods which have been already described, by which men arrived at conclusions from general principles supposed to be innate in the human mind. The vanity of these methods has already been characterized.

Inductive methods have found their best expression in the Baconian philosophy. By inductive methods men are to collect facts, unbiased by opinions, or preconceived theories. They are to gather the facts, put them together, arrange and combine them to find higher and still higher generalizations.

But there are facts and facts—facts with value, and facts without value. The indiscriminate gathering of facts leads to no important discoveries. Men might devote themselves to counting the leaves on the trees, the blades of grass in the meadows, the grains of sand on the sea shore;—they might weigh each one, and measure each one, and go on collecting such facts until libraries were filled, and the minds of men buried under their weight, and no addition would be made to philosophy thereby. There must be some method of selecting, some method of determining what facts are valuable, and what facts are trivial. The fool *collects* facts; the wise man *selects* them.

Amid the multiplicity of facts in the universe, how does the wise man choose for his use? The true scientific man walks not at random through the world making notes of what he sees; he chooses some narrow field of investigation. Within this field he reviews what is already known and becomes conversant with the conclusions already reached. He then seeks to discern more facts in this field, and to make more careful discriminations therein, and then to make more homologic classifications; and, finally, more thoroughly to discover the complexity of sequences.

If he attain to success in doing all this his investigations are always suggested by some hypothesis—some supposition of what he may discover. He may find that his hypothesis is wrong, and discover something else; but without an hypothesis he discovers nothing. A scientific man taking up a subject reviews the facts that are known, and imagines that they lead to conclusions that have not yet been reached by others. His imagination may lead him quite astray, yet he follows it, and says "Now if this be true, then there must be certain yet undiscovered facts," and he seeks for them. He may find that which he seeks, or he may find something quite other. If he be an honest thinker, a true philosopher, it matters not to him. He substantiates his hypothesis or constructs a new one. If such hypothesis leads to many new discoveries scientific men accept it, and call it a working hypothesis, and if it still leads on to discovery scientific men call it a theory; and so working hypotheses are developed into theories, and these theories become the fundamental principles, the major propositions of science, the widest generalizations of philosophy.

Sometimes the inductive method—the Baconian method—is said to have been modified or improved by the addition of the method by working hypotheses, and then modern scientific methods are said to be inductive. With this understanding, it may be said that the deductive methods of metaphysics have been supplanted by the inductive methods of science. It would, perhaps, be better to say that deductive and inductive methods have been superseded by the method of working hypotheses.

Working hypotheses are the instruments with which scientific men select facts. By them, reason and imagination are conjoined, and all the powers of the mind employed in research.

Darwin, more than any other man, has taught the use of working hypotheses. Newton and Darwin are the two great lights of science—the Gemini in the heavens of philosophy; stars whose glory is the brightest of all.

There be good folk in the world who love mythologic and metaphysic philosophy—one or both. In the ears of such the praise of Darwin is not sweet music. Let me beg of such who may be here to consider that we come to-night to praise our dead, and to tell of our love for the man who gave us hope. You and I cannot contend over an open grave, and in my soul I find no cause for angry contention elsewhere. Every man's opinions are honest opinions—his opinions are the children of his own reasoning, and he loves his offspring.

When I stand before the sacred fire in an Indian village and listen to the red man's philosophy, no anger stirs my blood. I love him as one of my kind. He has a philosophy not unlike that of my forefathers, though widely separated from my own, and I love him as one near akin.

Among civilized men I find no one who has not a philosophy in part common with my own; and of those smaller portions of our philosophies which are not alike I see no cause why anger should be kindled between us thereby. They and I are bound together by the same cord of honesty in opinion.

In Darwin's writings I find no word of reproach. Denunciation and ridicule, greater than any other man has endured, never kindled a spark of hatred in his breast. Wrapped in the mantle of his philosophy he received no wounds, but lived with and loved mankind.

Let us not gird science to our loins as the warrior buckles on his sword. Let us raise science aloft as the olive branch of peace and the emblem of hope.

DARWIN'S WORK IN ENTOMOLOGY.

By Charles V. Riley.

Charles Robert Darwin was one of the original members of the London Entomological Society, of whom only six are yet living. He always took the keenest interest in the science of entomology, and drew largely from insects for illustrations in support of the theory with which his name will forever be associated. Indeed, I have the authority of my late associate editor of the *American Entomologist*, Benjamin Dann Walsh, who was a classmate of Darwin's, at Cambridge, that the latter's love of natural history was chiefly manifested, while there, in a fine collection of insects; so that, as has been the case with so many noted naturalists, Darwin probably acquired from the study of insects that love of nature, which, first forever afterward, inspired him in his endeavors to win her secrets andi nterpret aright her ways!

Though he has left no descriptive or systematic work of an entomological character, yet his writings abound in important facts and observations anent insects, and no branch of natural science has more fully felt the beneficial impulse and stimulus of his labors than entomology. Indeed, the varying conditions of life in the same individual or species; the remarkable metamorphoses; the rapid development; the phenomena of dimorphism and heteromorphism; of phytophagic and sexual variation; the ready adaptation to changed conditions, and consequent rapid modification; the great prolificacy and immense number of individuals; the three distinctive states of larva, pupa, and imago, susceptible to modification, as well as other characteristics in insects—render them particularly attractive and useful to the evolutionist, and the changed aspect which natural history in general has assumed since the publication of the "Origin of Species" is perhaps more marked in entomology than in any other branch, for its author helped to replace ridicule by reason. During his voyage on the "Beagle" he collected a very large number of interesting species, especially in Coleoptera, and they formed the basis of many memoirs by Walker, Newman, and White, and particularly by G. R. Waterhouse, who named *Odontoscelis Darwinii* after him. These memoirs were published either in the Annals and Magazine of Natural History, and in the Transactions of the London Entomological Society, or in various entomological periodicals, and I append a list, which, in this connection, it is not necessary to read.

Scattered through his memorable works, a "Journal of Researches into the Natural History and Geology of the countries visited during the voyage of H. M. S. Beagle round the world," (which is best known by the publisher's title, "A Naturalist's Voyage Round the World,") and "The Origin of Species by means of Natural Selection," are many interesting entomological facts, and in almost every instance they are illumined by his masterly genius and his keen, penetrating mind. These are so numerous, so varied, and withal so widely dispersed, that I can only make reference, at this time, to a few of the most important and striking of them.

He pointed out the great preponderance of phytophagous over predaceous species in the tropics as exemplifying the relation of the insect and plant worlds, both of which attain their maximum in those zones. Carabidæ are few; Scavengers and Brachelytra very common; Rhyncophora and Chrysomelidæ astonishingly numerous. (Journal of Researches, etc., p. 34.)

He showed by minute observations that the insect faunas of Tierra del Fuego, separated from Patagonia only by the Straits of Magellan, have nothing in common, and he discussed the influence of primary barriers on the distribution of species, as shown in the marked divergence of the faunas on the eastern and western slopes of the Cordillera. "We ought not," he remarks, "to expect any closer similarity between the organic beings on the opposite sides of great mountain ranges than on the opposite shores of the ocean, except for species which have been able to cross the barrier, whether of rock or salt water." (*Ibid*, pp. 326–7.)

I believe he was the first to draw attention to the paucity of insects on islands, and to establish the principle that the smaller the area, the less favorable it is for the development of insect life. (*Ibid*, p. 391.)

It is a fact of observation that islands predispose to the apterous condition among insects, a fact that is especially noticeable in Kerguelen's Land, as observed by Dr. Hooker, and particularly by our fellow member, Dr. Kidder. Darwin (Origin of Species, etc., p. 109,) first suggested the most plausible reason, viz: that the indiscriminate use of wings might prove injurious to an insular species by tempting it out to sea and to destruction, so that the loss of the power of flight is a positive advantage to the species. The argument against this explanation, viz: that insular species should be gifted with strong powers of flight to fortify themselves against being blown to sea in heavy gales, has little force, because either requirement may be fulfilled; and, in reality, where flight is absolutely necessary, as in the majority of Lepidoptera, and flower-frequenting Coleoptera, the wing capacity, in insular species, is actually increased, or correlated with a diminution of bulk; whereas, in those less dependent on aërial progression, natural selection would decrease wing-power, and there would be just such a correlated increase of bulk as is generally the case.

The principle he laid down, that the accidental introduction of organic beings amongst others to whose interest they are hostile, may be a powerful means of keeping the latter in check, and of finally destroying them, finds vivid exemplification in insects, as I have shown in discussing those imported into this country.*

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*Second Annual Rep. on the Insects of Missouri, 1879, pp. 8–13.

He gave reasons for the belief (now generally accepted) that the usual gaudy coloring of intertropical insects is not related either to the heat or light of those zones, but rather to the conditions of existence being generally favorable to life.—(Journal of Researches, etc., p. 381.) He has written on the Phosphorescence of Fire-flies, and on the habits of the larva of one of them—*Lamphyris occidentalis.* —(*Ibid*, pp. 29–30.) He discussed the food-habits of stercovorous beetles, with reference to the origination of a new habit and the power of adaptation to new conditions.—(*Ibid*, p. 490, note.)

At Port St. Julian, Patagonia, he found a species of Tabanus extremely common, and remarks: "We here have the puzzle that so frequently occurs in the case of mosquitoes—on the blood of what do these insects commonly feed? The guanaco is nearly the only warm-blooded quadruped, and is found in quite inconsiderable numbers compared with the multitude of flies." He has discussed the question of hibernation of insects, and shown that it is governed by the usual climate of a district, and not by absolute temperature. (*Ibid*, 98–9.) He gave the first true explanation of the springing power of the Elateridæ when laid on their backs, showing how much depended on the elasticity of the sternal spine. (*Ibid*, p. 31.) He was the first, I believe, to record the exceptional powers of running and of making sound, in a butterfly, viz., *Ageronia feronia* of Brazil.

In his most famous work he lays stress particularly on the following facts and generalizations, for which he draws from insects: the individual differences in important characters; the remarkable manner in which individuals of the same brood often differ, dimorphism and trimorphism being only the extreme exaggeration of this fact; the difficulty of distinguishing between species and varieties; that geographical races are local forms completely fixed and isolated; that representative species are better distinguished from each other than local forms and sub-species; that the species of large genera vary more frequently than those of small genera, and that specific differences in the former are often exceedingly small;

that fecundity does not determine the rate of increase; that the struggle for life is most severe between species of the same genus; that secondary sexual characters are generally displayed in the same parts of the organization in which the species of the same genus differ from each other; that distinct species present analogous variations; that similar structures are often independently developed; the varying importance for classification of the same important organ in the same group of beings; that analogical or adaptive resemblances are misleading for classification; that the great frequency of mimicry among insects is associated with their small size and general defencelessness, as no species furnished with a sting, or other defensive property, is known to mimic other species; the importance of relative position or connection in homologous parts; the remarkable changes of structure effected during development; that adaptation to the conditions of life in the insect larva is just as perfect and beautiful as in the adult animal, and that, consequently, larvæ of different orders are often similar, and larvæ belonging to the same order often very dissimilar; that larval and pupal stages are acquired through adaptation, and not through inheritance; that rudimentary organs plainly declare their origin and meaning.

Finally he brought together a large body of interesting facts in entomology, bearing on the development and perpetuation of mimicry, and of secondary sexual characters—all more or less explicable by, and furnishing convincing argument for, the general theory of natural selection; while he freely acknowledged that he found among insects facts that seemed to be most fatal to the theory. This is especially the case in social insects where the colony contains neuters and sterile females which often differ widely in instinct and in structure from the sexual forms, and yet cannot propagate their kind. This is not the place to enter into a discussion of the subject, and I will simply remark that there are reasons for the belief that, in his candor, he has been led to exaggerate the difficulties in this case.

But Darwin's chief investigation into insect life were in its relations to plant life, and his work "On the Various Contrivances by which British and Foreign Orchids are Fertilized by Insects, and on the good effect of crossing," as also that on "Insectivorous Plants," are monuments of skill, industry, and lucid exposition.

Entomologists had often noticed the pollen masses of orchids attached to the proboscis of various moths, and in commenting upon the fact had pronounced it "curious." Darwin in this, as in so many other cases, gave meaning to the curious, and brought light out of darkness.

Before his time we find frequent reference to the injury caused to plants by insects, and Sprengel, Gaertner, Herbert, and others had shown that insects were, also, in many cases, beneficial and even necessary to plants, the color, form, odor, secretions, and general structure of which have reference to their necessary insect pollinizers.

Yet their writings had produced but slight impression outside of a limited circle. It remained for Darwin to impress the world with a broader sense of the actual interrelation between the two, and to inspire a number of observers in this field, in all parts of the globe, who are now constantly adding to the rich store of facts we already possess on the subject. I need only refer to the work of Hooker, Bennet, Axell, Delpino, Hildebrand, H. Müller, and others abroad, and to that of Dr. Gray, and Mr. Wm. Trelease at home.

The importance of insects, as agents in cross-fertilization, was never properly appreciated till after Darwin's remarkable work on Primula, and his researches on Orchids, Linum, Lythrum, etc.

He established the principle that "nature abhors close fertilization," and though some less careful observers in this country—exaggerating the importance of their isolated and often inaccurate observations—have opposed his views, the scientific world has been convinced alike by the force of his logic as by the eloquence of his innumerable facts.

We all know how palæontology has verified many of his anticipations as to missing links being supplied with increased knowledge of the geological record, and in connection with his work on the fertilization of orchids, we have a remarkable instance of similar verification. The nectaries of *Angræcum sesquipedale* were found by him to sometimes reach 11½ inches in length, with only the lowest 1½ inches filled with nectar. He said "there must be moths with probosces capable of extension to a length of between 10 and 11 inches." In *Nature* for July 17, 1873, or some years later, Fritz Müller recorded, through his brother, Herman Müller, the finding of a Brazilian Sphingid having a length of proboscis of 0.25 meters, or between 10 and 11 inches.

I cannot do justice to Darwin's work on Insectivorous Plants within the time to which these remarks have been limited, nor without trenching on the ground to be covered by Prof. Ward. I must be content to remark, therefore, that he demonstrated the new and wonderful fact in physiology that many plants are capable of absorbing soluble matter from captured insects, and that they have special contrivances and sensibilities that facilitate the capture of their prey: in other words, that plants actually capture and digest animal food; for the secretion of *Drosera*, and other insectivorous plants, with its ferment acid belonging to the acetic series, resembles the gastric juice of animals with its pepsin and hydrocloric acid. The fact of absorption demonstrated, it follows that the process would prove serviceable to plants growing in very poor soil, and that it would tend to be perfected by natural selection.

The pleasure Darwin took in observing the habits and ways of insects, and the simple and lucid manner in which he recorded his observations are frequently exemplified in his Journal of Researches, and his account of sundry Brazilian species on page 35, and following, may be consulted as an example.

In the same way that he has influenced all lines of thought and investigation, he has influenced entomology. We find everywhere, in his treatment of insects, the same acute perception, the same candor and impartiality, the same clearness of expression, the same aptitude to get at the significance and bearing of facts observed, as well as the same readiness to deduce a theory which is only equaled by the devotion with which he clings to the truth, whether favorable or unfavorable to the theory.

In the light of Darwinism, insect structure and habit have come to possess a new significance and a deeper meaning. It has, in short, proved a new power to the working entomologist who, for all time, will hold in reverence the name of him who, more than any other man, helped to replace scholasticism by induction and who gave to the philosophic study of insects as great an impetus as did Linnæus to their systematic study.

In his private life Darwin has given us a lesson of patience, courtesy, and consideration, that will be best appreciated by those who have the misfortune to be endowed with more irritable and aggressive natures.

As the above account of Darwin's entomological work is doubtless rather uninteresting to most of those gathered here, I will close, by request, with a few personal impressions.

I have had the pleasure on two occasions of visiting Darwin at his invitation. On the first occasion, in the summer of 1871, I was accompanied by Mr. J. Jenner Wier, one of his life-long friends and admirers. From Mr. Weir I first learned that Darwin was, in one sense, virtually a confirmed invalid, and that his work had been done under physical difficulties which would have rendered most men of independent means vapid, self-indulgent, and useless members of society.

It is eloquent of the indomitable will and perseverance of the man that, during the long voyage on the Beagle, he suffered so from sea-sickness that he never fully recovered from the shock to his system, and could not again venture on the ocean. He had, in fact, on his return from the voyage, to go through a long course of hydropathic treatment. We also now know that though he had suffered much for some months past from weakness and recurring fits of faintness, and had been confined to the house, yet as late as

Tuesday evening before the day of his death, at 4 P. M., Wednesday, he was in his study examining a plant which he had had brought to him, and that he read that night before retiring, while as late as the 16th of March, he read two papers on special botanical subjects before the Linnean Society.

The village of Down is fifteen miles southeast of London, four miles from Orpington station on the Southeastern Railway. The country is among the most beautiful agricultural suburbs of London, and I shall never forget the impression of peaceful, quiet seclusion experienced, as we drove from the station and finally through one of those characteristic English lanes, just wide enough for one vehicle, and worn down several feet below the general level—the sense of confinement being enhanced by the luxuriant hedge on either side. This lane skirts the orchard wall for 100 yards and then goes in front of the house, from which it is separated by a grass plot and flint wall overgrown with ivy.

The Darwin residence is a plain, but spacious, old-fashioned house of the style so common in England, and which, with the surrounding well-kept grounds and conservatory, convey that impression of ease and comfort that belong to the average home of the English country gentleman. A noticeable feature is a bow window extending through three stories and covered with trellis and creepers. In Darwinian phrase the environment was favorable for just such calm study and concentration as he found necessary to his health and his researches.

Upon introduction I was at once struck with his stature (which was much above the average, and I should say fully six feet,) his ponderous brow and long white beard—the moustache being cut on a line with the lips and slightly brown from the habit of snuff-taking. His deep-set eyes were light blue-gray. He made the impression of a powerful man reduced somewhat by sickness. The massive brow and forehead show in his later photographs, but not so conspicuously as in a life-sized head of him when younger, which hung in the parlor.

In the brief hours I then spent at Down the proverbial modesty and singular simplicity and sweetness of his character were apparent, while the delight he manifested in stating facts of interest was excelled only by the eagerness with which he sought them from others, whether while strolling through the greenhouse or sitting round the generously spread table.

Going to him as a young entomologist with no claim on his favor, he seemed to take delight in manifesting appreciation. I had occasion in my third report on the insects of Missouri, published in the spring of that year, to discuss the question of Natural Selection in its bearings on Mimicry, as exemplified in two of our North American butterflies, (*Danais archippus* and *Limenitis disippus.*) This report I found in his study with many leaves turned down, and he appeared to take especial pleasure in conveying a sense of his appreciation of particular parts.

The few letters which I received from Darwin were in his own hand-writing, which was rapid and better calculated to save time than to facilitate the reading. I take the liberty of reproducing here the first and last as indicating his attitude toward all workers in the field of natural science, however humble or however undeserving of his praise they may have been; and this generous trait in his character will explain, in some measure, the stimulus and encouragement which he gave to investigators:

DOWN,
JUNE 1, [1871.] BECKENHAM, KENT.

MY DEAR SIR: I received some little time ago your Report on Noxious Insects, and have now read the whole with the greatest interest. There is a vast number of facts and generalizations of value to me, and I am struck with admiration at your power of observation. The discussion on mimetic insects seems to me particularly good and original. Pray accept my cordial thanks for the instruction and interest which I have received.

What a loss to natural science our poor mutual friend, Walsh, has been: it is a loss ever to be deplored.

Pray believe me, with much respect,
Yours, very faithfully,
CH. DARWIN.

DOWN,
SEPTEMBER 28, 1881. BECKENHAM, KENT.

MY DEAR MR. RILEY: I must write half-a-dozen lines to say how much interested I have been by your "Further Notes" on Pronuba, which you were so kind as to send me. I had read the various criticisms, and though I did not know what answer would be made, yet I felt full confidence in the result, and now I see I was right. * * * *

If you make any further observation on Pronuba it would, I think, be well worth while for you to observe whether the moth can or does occasionally bring pollen from one plant to the stigma of a distinct one; for I have shown that the cross-fertilization of the flowers on the same plant does very little good and, if I am not mistaken, you believe that the Pronuba gathers pollen from the same flower which she fertilizes.*

What interesting and beautiful observations you have made on the metamorphoses of the grass-hopper destroying insects!

Believe me,
My dear sir,
Yours sincerely,
CH. DARWIN.

My own experience in this regard is the common experience, for an interest in natural science was an open sesame to his generous soul. His consideration, without aggression, was the secret of the gratitude and respect which all felt who had the honor to know him, either personally or through correspondence.

His approval of the work of others was coupled with a depreciation of his own, which was very marked on the occasion of my second visit to Europe, in 1875, when I crossed the ocean with his son Leonard on his way from the Transit of Venus expedition. "Insectivorous Plants" was just finished and Darwin was worn and in feeble health, staying, in fact, at Abinger Hall for rest. He was quite disgusted with the book, to use his son's expression, and doubted whether it could prove of sufficient interest, with its long and dry records of experiments, to be read by any one.

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*This is a misapprehension. Pronuba is an effectual cross-fertilizer, running from flower to flower, and often flying from raceme to raceme with one and the same load of pollen. The omitted passages in this letter refer to the work of a gentleman still living.

DARWIN AS A BOTANIST.

By Lester F. Ward.

Appointed by the committee to furnish a brief sketch on this occasion of the contributions of Charles Darwin to the science of plants, I have purposely chosen the title, "Darwin as a Botanist," in order to emphasize the contrast which may be drawn between different classes of botanists, and to do what I can to accustom the public mind to associate with the terms *botanist* and *botany* certain great fields of investigation which are now rarely suggested by these words.

If I had entitled my paper: Darwin's researches into the phenomena of the vegetable kingdom, I fear it might not have occurred to some of you that this great investigator was a botanist, as he is not generally known as such. Yet I fail to see why the science of botany is not fully entitled to receive its share of the dignity and the luster which Darwin's investigations have reflected upon biology in general.

The popular idea of botany, however, is very different from this. Not ignorant people alone, but scientific men as well, place all botanists under two general classes: "Field Botanists" and "Closet Botanists."

The field botanist is one who, being passionately fond of plants and having mastered the rudiments of botany and become familiar with the names and classification of plants, searches the country for new and rare species, and for new localities for old ones, and makes large collections. Success in these objects is his triumph, and occasionally becoming the proud discoverer of hitherto unknown forms of vegetable life, he finds the scientific world quick and generous in awarding him due credit.

The closet botanist is one who, disdaining the boyish pursuit of flowers, devotes himself to the study of the characters of plants as revealed by the herbarium specimens which the field botanist so copiously furnishes, and by which method he, too, can discover "new species," and obtain prompt recognition. The closet botanist performs the further useful service of "revising" intricate families and genera of plants, unraveling the entanglements of previous authors, and making such changes in the classification and names as are best suited to secure the maximum personal credit.

I need not tell this audience that Charles Darwin belonged to neither of these classes of botanists. A lover of nature, he yet never wasted precious time in the idle pursuit of rarities. Thoroughly familiar with the distinctive characters upon which botanical classification rests, he yet never pursued to any marked extent the investigation of specimens from the *hortus siccus*. I doubt whether a single species of plant was ever named after him by reason of his having either discovered it in a wild state or detected its specific distinct ness by the examination of its characters. I even doubt whether he possessed an herbarium, in the accepted sense of the word.

And yet this man has probably contributed more to our real knowledge of plants than any other single botanist.

In what, then, have Darwin's botanical investigations consisted? There is a little French book entitled "Voyage d'un Botaniste dans sa Maison," a title which, allowing for the characteristic hyperbole of the French tongue, suggests the general nature of Darwin's botanical studies. His researches were conducted in his laboratory, in pots of plants at his window, in his aquarium, in his green-house, in his garden. He worked with instruments of precision, recorded his observations with exactness, and employed every mechanical device for making his results reveal important truths, of which the genius of man would seem to be capable.

Darwin looked upon plants as *living things*. He did not study their *forms* so much as their *actions*. He interrogated them to learn what they were *doing*.

The central truth, towards which his botanical investigations constantly tended, was that of the universal *activity* of the vegetable kingdom—that all plants *move* and *act*. He has, so to speak, *animated* the vegetable world. He has shown that whichever kingdom of organic nature we contemplate, to *live* is to *move*.

He blandly rebukes the vulgar notion that "plants are distinguished from animals by not having the power of movement," and still more modestly says that "plants acquire and display this power only when it is of some advantage to them." But is this the whole? Do animals display this power except when it is of some advantage to them? Certainly not.

Darwin shows us that certain parts of all plants are at all times in motion; not merely the molecular activities of their tissues and of the living protoplasm in their cells, but organized movement of parts. Every leaf, every tendril, every rootlet, possesses the power of spontaneous movement, and under nearly all circumstances actually exercises that power.

There are a great many distinct kinds of movement, depending in all cases upon the special advantages thereby gained to the plant. The laws under which these movements take place have received from him an admirable terminology. Most of them are conditioned either by light, by gravity, by radiation, or by insect agency.

We thus have of the first class, *heliotropism*, or movement towards the light; *apheliotropism*, or movement from the light; *diaheliotropism*, or movement at right angles to the source of light; and *paraheliotropism*, embracing such movements as screen the plant from excess of light.

To the second class belong: *geotropism*, or movement towards the earth or into the soil; *apogeotropism*, or movement contrary to the force of gravity; and *diageotropism*, or movement at right angles to the force of gravity.

The third class embraces the so-called *nyctotropic* movements of plants by which they appear to sleep, and which prove to be devices for the prevention of excessive radiation of the plants' heat.

Under the fourth class fall all those wonderful movements which aid the plant in preventing self-and securing cross-fertilization, a subject of the most absorbing interest, and of which you have already listened to so able a presentation by Prof. Riley from the point of view of the entomologist.

But Darwin's great service has been to show that these varieties of activity are simply modes in which inherent and spontaneous activities manifest themselves under these varying external influences.

His preliminary investigations into the nature of these innate powers of movement were directed to that large class of plants known as twiners and climbers, whose revolving motions were so thoroughly described in his work on "Climbing Plants." It was here that he laid the foundation for those later studies which eventually resulted in that great work, almost his last, on the "Power of Movement in Plants." In this work he demonstrates by an enormous induction that the ample sweeps of the twining plant are but the most obvious manifestations of a class of phenomena which are common to the entire vegetable kingdom.

Amid the varied forms of movement which plants present Darwin has succeeded in finding one fundamental and generic one to which every other may be referred. To this universal form of plant activity he gives the name "circumnutation." Not only twining stems and tendrils, but parts of flowers, tips of growing shoots, caps of penetrating roots and rootlets, radicles, epicotyls, cotyledons, and even full-grown leaves, are incessantly describing circles, ellipses, and other more or less regular geometrical figures; and he conclusively shows that it is out of this primary form of activity that all the more specialized forms already mentioned have been developed. All movements of the parts of plants are thus to be interpreted as modified forms of this innate periodic circumnutation which is common to all plant life. Such modifications are always in the direction of the plant's advantage and may be so great as to become difficult of recognition as forms circumnutation.

I need not labor to convince you that any modification which is an advantage to the plant will be secured by the process of natural selection. It is the glory of the great genius whose labors we are here to commemorate to have demonstrated this truth to the entire satisfaction of the united scientific world.

Darwin has actually solved the great problem of phytology, so long supposed to be incapable of solution, viz: Why does the root grow downward and the stem upward? Briefly and roughly stated, the answer to this question is that, as the bursting seed pushes out its two germinal points these circumnutate from the first, and thus explore their surroundings for the means of benefiting the plant. To employ Darwin's own word, they "perceive" the advantage that would result from the penetration of the soil, on the one hand, and from the ascent into the free air and sunlight, on the other, and through the pre-Darwinian law of the "physiological division of labor," the one becomes *geotropic* and the other *heliotropic*—the one develops into a radicle and then into a root, while the other develops into an epicotyl and then into a stem.

I will only add to the thoughts already presented that Darwin's discovery of the existence in all plants of an innate and spontaneous mobility belonging to them as forms of organic life, possesses an important ulterior significance.

The law of natural selection, as a fundamental process, has long since passed the stage of discussion. But there has always remained one unsettled question lying at its very base which Darwin himself admitted to be an open one. That question concerns the cause itself of variation. It is granted that, admitting the *tendency to vary*, all the results claimed for natural selection must follow; but many declare that, in this very tendency to vary, there is a mystery as great as the mystery of life itself.

It is only in this work on the "Power of Movement in Plants" that Darwin has really assailed this last fortress of supernaturalism. Not that he has avowed any such purpose, for of this he would have been incapable, but so skilfully and so powerfully has he marshaled the facts that the conclusion follows without being stated. No one can doubt that he perceived this, and I, for one, am convinced that he saw it from afar, and that it was the great end of his labors;

but with his characteristic wisdom he has declined to invoke the *odium theologicum*, correctly judging that the truth must ultimately assert itself.

The tendency to vary, then, is a mechanical result of the proved fact of universal movement coupled with the admitted law of natural selection. By means of the former all plants and growing parts of plants are perpetually exploring their immediate surroundings in search, as it were, for conditions favorable to development. By means of the latter they are able to avail themselves of such favorable conditions when found. Nothing further than this is required to complete the natural explanation of all the phenomena presented by the organic world, and thus, at last, the whole domain of biology is emancipated from teleological fetters, and placed on the high plane of rational investigation.

In conclusion, let me simply say that, while we can but deeply mourn the irreparable loss which science has sustained in the death of Charles Darwin, we have still the highest grounds for congratulation in the fact that he lived to complete that great work which, next to the "Origin of Species," will, I firmly believe, be awarded by posterity the highest place, viz. ,"The Power of Movement in Plants;" for, while the former auspiciously opened the great debate by stating the profoundest of all biological problems, the latter has fittingly closed the argument by answering the last objection.

DARWIN ON THE EXPRESSION OF THE EMOTIONS.

By Frank Baker, M. D.

From the tendency of the imagination to magnify the unknown and remote, arises a popular error that to attain eminence a man of science must be able to gather facts from great distances—from the sources of the Nile, and from polar snows. But the near and commonplace are subject to the same laws as the atoms of interstellar space, and true scientific insight may discover in the very dust under our feet secrets hitherto concealed.

Darwin's work upon the Expression of the Emotions is continuous with and supplementary to his larger and better-known treatise on the Descent of Man. As with other matter bearing directly upon the development hypothesis, its publication was deferred as long as possible, in order that the evidence might be fully weighed. Projected in 1838, it was not published until thirty-five years later. One class of objections to the hypothesis was not considered in the main work. It was generally held that, by his emotional expression, man was widely separated from the lower animals. The eminent anatomist, Duchenne, who remains to-day the best authority on muscular movements, merely expressed the views of the time when he stated that no cause could be assigned for facial expression, except the "divine fantasy" of the Great Artificer.

Having projected his work, how does Darwin proceed? From the gentlemen who have preceded me you have learned of his methods. To test the truth of his conceptions he commences a series of most minute and careful observations, omitting nothing within his reach. His most important field is that which is nearest; his own children, his friends and companions, even the dogs that accompany his daily walks, come under that powerful scrutiny. Where, indeed, can we find so perfect an observer? The calm sanity of his mind keeps him equally aloof from egotism and from self-depreciation. A fact is a *fact*, to be stated with the fairness and openness of perfect daylight. Here is a man who cares more for the truth than for himself. The black spot in man's sunshine, the shadow of himself, seems non-existent for him. He stands by his work, that is enough; if it has worth, well—if not, still well; the elemental drift of action and reaction will continue, the outcome will still be good. As Carlyle has said, "A noble unconsciousness is in him. He does not engrave *truth* on his watch-seal; no, but he stands by truth, speaks by it, works and lives by it."

But not as a fact gatherer do we find him greatest. Many others have struggled with ant-like toil to amass piles of facts which, like the ant-heap, remain but sand after all. Darwin brings to his work an informing spirit, the genius of scientific hypothesis. Breathed upon by this spirit, the dry bones of fact come together "bone to his bone," the sinews and the flesh come upon them, they become alive and stand upon their feet "an exceeding great army." He searches always for the principles which underlie the facts and make them possible, realizing that the *phenomena*, the things which are seen, are temporal and transitory; the things which are not seen, the cosmical forces which govern and control, are eternal.

In his examination of the expression of the emotions he found that both in man and animals they can be referred to three general principles which may be termed habit, antithesis, and nervous overflow. By habit, or repetition, serviceable movements become fixed—involuntary, or semi-voluntary. By antithesis, opposite frames of mind are expressed by opposite actions, even though those actions may not be serviceable. The theory of nervous overflow is that unusual quantities of force generated by the cerebro-spinal system are discharged by unusual channels of expression when the ordinary channels are insufficient.

He finds that emotional expressions are generally direct consequences of anatomical structure, and clearly shows the interdependence of anatomy and physiology. For structure can no more be divorced from function than matter can be dissociated from force. All the complex expressions of grief—from the twitching of the eyelids and mouth to the shedding of tears—he has shown to depend upon the necessity for preventing engorgement of the eyes during screaming, an act originally useful solely to attract attention. The steps by which he arrived at this conclusion are typical of his method. Starting first with animals, he finds that their expressions of grief are much less complex and various than those of man. They are confined to noises, such as screaming, barking, whining, in higher forms accompanied by changes in facial expression, particularly by contraction of the muscles surrounding the eye. There is a physiological necessity for this, as otherwise the expiratory effort caused by screaming might engorge and rupture the small ocular blood-vessels. By pressing on the lachrymal gland this causes, in some of the higher animals, a flow of tears. What at first was accidental, merely occasioned by the proximity of the gland, becomes at last habitual, and the nervous force automatically follows the line of its accustomed action, causing a flow of tears after emotional excitement, even though no screaming take place. The correctness of this view is supported by the fact that infants do not shed tears until several weeks old, although they scream violently. The functional activity of the lachrymal gland, in connection with grief, is, therefore, later in phylogenetic development. The laws of heredity and adaptation are found to be operating here, as elsewhere, in the domain of life; the supposed gap between the emotions of man and of other animals is successfully bridged over, and another anthropocentric fallacy is consigned to the limbo of ignorant superstitions.

Many expressions of the lower emotions are found to be disfiguring vestiges of acts useful to lower animals for offense and defense, or for obtaining food. These survive—relics of the previous history of our race—as rudimentary organs are preserved long after their use has ceased. The erection of the hair during fear is remotely derived from the same cause that makes puss bristle when attacked and the puff adder swell out when approached. Originally used for the purpose of exciting fear in an enemy by an increase of size, it now involuntarily accompanies the somewhat changed emotion of which some of the phases are extinct. It is not very rare to find persons who can make the hair over the front of the head bristle at will. Rage is habitually expressed by uncovering the teeth, which is, in the lower animals, an attempt to frighten their enemies by a show of weapons. This expression may become softened and modified to express the milder emotions of contempt and disdain. I have met a lady who has to perfection the rather rare accomplishment mentioned by Darwin of drawing up the upper lip in a triangular notch directly over the canine teeth so as to display them alone, usually on one side at a time. This most expressive gesture of disdain can be performed under the influence of the emotion by many who cannot do it at will.

Of an opposite class are certain higher expressions, which, having arisen later, are not yet entirely fixed. Blushing is one of the most curious of these. It is not found in infants, and varies greatly in frequency and amount in adults, accompanying the sentiment of modesty, almost unknown among animals. The reddening is usually confined to the face and neck. Darwin suggests an ingenious explanation for this. The blood-vessels most exposed to variations of temperature acquire the habit of expanding and contracting—their vaso-motor nerves become more sensitive. The chief expression of personal appearance is in the face; the attention of the mind is, therefore, directed there whenever the emotion of modesty is aroused. This interferes with the ordinary tonic contraction of the blood-vessels, and an excess of blood suffuses the surface.

A remarkable confirmation of Darwin's views is the recent discovery of localized centers in the brain which control emotional expression, and exist in animals as well as in man. It may sometime be possible to read the currents and counter-currents of the brain by means of feature-play with a precision approaching that by which we estimate the force of a distant battery by the play of a galvanometer needle. Many phenomena of expression, which were obscure before this discovery, can now be satisfactorily explained. Among these are the phenomena of associated movements. It has been stated that the variety and complexity of the movements involved in the simple act of walking are such that it would be impossible ever to perform it were it necessary to *think* what had to be done, and weigh in the judgment the precise amount of force necessary to distribute to each muscle at each moment of the act. It is now known that the cerebral centers which control the separate muscles put in action are closely contiguous in the brain, and that they probably intercommunicate and excite each other in a definite manner, predetermined by habit and heredity. The conscious mind has only to set in motion the subordinate apparatus, when it goes on, and works out the problem with matchless skill, like the system of cogs and eccentrics that produce the intricate pattern in an engraver's lathe. All have noticed the uncouth manner in which children and untrained persons follow with lips and tongue the motions of their hands when using a tool of any kind. Darwin ascribes this to unconscious imitation, but it can be explained more strictly in accordance with his own principles. The facial muscles are actuated from a cerebral center in close proximity to those which move the arms and hands. In the lower animals this is necessary, for the mouth is an organ of prehension, used in strict association with the fore-limbs in seizing prey, and in other acts. As this associated movement became strongly fixed by long habit, it survives with great obstinancy, and though it has not been useful to the race since the historical period, we have yet to caution our children not to put their tongues out when they write.

My limit of time forces me to conclude this hasty and imperfect summary. The practical bearing of these views is not without importance. Physicians have always depended greatly upon emotional expression as a means of diagnosis. Unconsciously the face of the patient reveals his physical state. Yet too much has been left in the empirical border-land of science. *Why* a certain pathological state should be indicated by a definite combination of expressions has not always been clearly shown. To-day the whole subject is studied from the point of view of anatomy and physiology. No occult force is admitted, the correlative nerve-supply of muscles and the effect of excitation of nerve-centers are rationally investigated.

Aside from the great special value of the work, of what tremendous import to the race are Darwin's deductions! For he has shown us that our every thought and act mold our physical frames, and through them the generations yet unborn, either to beauty and grace, or to uncouth ugliness and deformity. As the struggle for existence filled the rocks with organisms forever extinct, because not for the highest use, so may we, too, fossilize and outgrow habits and desires of ignoble birth, ascending by the "power of leasts," by that wondrous calculus of nature, to purer and nobler existence. Darwin has taught us that the forces which, acting through countless cycles, have brought us up from formless slime, now remain in our hands to use for good or ill—

> "That life is not as idle ore,
> But iron dug from central gloom,
> And heated hot with burning fears,
> And dipt in baths of hissing tears,
> And battered with the shocks of doom
> For shape and use."

A DARWINIAN BIBLIOGRAPHY.

By Frederick W. True,

Librarian of the U. S. National Museum.

The complete bibliography of Darwinism should contain, not alone the works which emanated from the busy brain and ready pen of Darwin himself, but the many other productions which these called into life. The aquiescences of friends, the objections of critics, the censures of foes, should all be enrolled in their proper places as representing the ripples and counter-ripples in the sea of thought, produced by the weighty ideas which dropped from the clear mind of the philosopher. It is not to the merits of these, however, that I can call your attention, but only to a few facts relative to the books of Darwin himself.

I would not have you suppose, if, indeed, one could, after the lucid remarks to which you have listened, that the faulty—and, I fear, almost indiscernible—list of published works, which I have attempted to exhibit before you, reveals more than a moiety of Darwin's writings.* A large number of comprehensive papers, pregnant notes, and incisive queries are contained in those storehouses of precise knowledge, the journals of science, and the publications of learned societies. During more than half a century, from the beginning of Darwin's career to its very close, scarcely a year passed in which a number of articles did not issue from his pen. His first paper, on the Ova of Flustra, and another of similar nature, were read before the Plinian Society, of Edinburgh, in 1825. His last note on the Distribution of Fresh-water Bivalves appeared in *Nature* but a few days before his death.

During the first twenty-five years the articles have mostly a geological and zoological bearing, but later botanical and anthropological subjects come into prominence. They were contributed to many publications, including a few American, German, and French journals. The mass of papers, however, are to be found in the Proceedings and Transactions of the Geological Society of London, the Philosophical Transactions, the Philosophical Magazine, the Annals and Magazine of Natural History, and Nature.

It is in these papers that we first find the germs of many of those more elaborate works, to which general attention has been attracted. Thus the works on the Origin of Species, the Fertilization of Plants by Insects, the Action of Earth Worms, and others were foreshadowed at a time considerably antedating their final appearance.

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* The speaker referred to two large scrolls hanging on the lecture room walls, upon which were inscribed a list of Darwin's most important publications.

Darwin seemed to prefer to work out and write out his ideas alone. Once at least, however, he shared the toil with his friend, Mr. Wallace, and later, in several instances, with his sons, Francis and George Darwin.

Regarding the separately published works of Darwin, there is much of interest from the bibliographical point of view. The conscientiousness with which the author profited by the criticisms of others, revising, improving, and extending his generalizations, makes each new edition seem like a separate production. Whole chapters were stricken out and new ones inserted; facts of doubtful character were replaced by others of a more positive nature and more recent acquisition.

Time forbids that I should refer to the details of publication of more than one work. The inquiring student will find his wants satisfied in the several lists which have already been published.

I will give the history of but one work, the most important of all, the "Origin of Species by Means of Natural Selection." The first edition of this work received the signature of the author on November 24, 1859, and was published the same year. The second edition, which appeared soon after, "was little more than a reprint of the first." "The third edition was largely corrected and added to, and the fourth and fifth still more largely." The sixth edition, which appeared in 1872, was likewise largely amended, and had reached its twenty thousand in 1878. In the meantime foreign editions and translations began to appear. The American and French editions at first kept pace with the English, the second American being from the second English, and the third French from the third English. The Germans, coming in a little later, published their second edition from the third English, and their third, from the fourth English one. The last editions in all these languages were derived, I believe, from the sixth English one. "The Italian is from the third, the Dutch and three Russian editions from the second English editions, and the Swedish from the fifth English edition."

At least twelve of the more important works have been issued in one or more editions in German and French, and a number in other European languages as well.

The sage of Down was undoubtedly honest in his surprise at the ever-extending circle of his influence. A wider and more intelligent audience could scarcely be desired. The number of books in which his opinions are discussed or alluded to is legion. As the illustrious Asa Gray has remarked, "Dante literature and Shakespeare literature have been the growth of centuries, but Darwinism filled teeming catalogues during the life time of the author."

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APPENDIX.

THE PROPER USE OF THE TERM BIOLOGY.*

BY THEODORE GILL.

From the Presidential Address delivered January 28, 1881.

The father of modern natural history, following in the footsteps of his predecessors, recognized three kingdoms of nature, and allowed them equal rank in his scheme of classification. These were severally the subjects of the sciences designated as mineralogy, botany, and zoology. The contrasts between the characteristics of the first and the last two, and the generalities which have since compelled us to employ a term in common for botany and zoology, were not then appreciated. The same method and the same system of terminology were used by Linnæus for the description of the mineral as for the vegetable and animal kingdoms. Nevertheless suggestions had been made still earlier towards a segregation under a common head of the kingdoms of organic nature.

As early as 1587, Cristofle de Savigny, in a scarce and little-known work (Tableaux accomplis de tous les arts libéraux, Paris,) contrasted the organic kingdoms under a common denominator, *psychologie*, now universally accepted with a very different signification. The suggestion in question, however, fell still born. It was not till 1802 and 1803 that a term destined to general adoption was proposed. Then the illustrious Lamarck made use of the word BIOLOGIE as a common name under which to consider the phenomena presented by organic nature. A number of words were subsequently urged as substitutes and as better, *e. g.*, *Somiologie* by Rafinesque, in 1814; *Physique Organique* by Comte, in 1830; *Organomie* by d'Omalius d'Halloy, in 1838; *Zoologie* by Jean Reynaud, in 1843; *Organologie* by Gerdy, in 1844; and, lastly, *Zoonomy* by Baden Powell. None of them, however, have been received with favor, and, slowly at first, afterward by general consent, BIOLOGY was accepted as a term much needed to group the many generalities enunciable respecting animals and plants. The old professorships of natural history or of zoology and botany combined are now being replaced by professorships of biology, and almost *pari passu* with cxcessive (because exclusive) cultivation of special departments of botany and zoology has been a tendency to combine on common ground to consider the general laws and principles affecting alike the organic kingdoms of nature, and by students agreeing in the method which they employ in their several pursuits. As a result of this feeling has been born the BIOLOGICAL SOCIETY OF WASHINGTON.

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* Much discussion having attended the consideration of a name for the "Biological Society of Washington" the subject was treated of in the first presidential address, and that portion thereof relating to the question at issue is here reproduced.

The applicability of the term biology, in the sense now so generally accorded to it, is doubtless debatable, and has been strongly objected to by an eminent scholar, Baden Powell. That gentleman, in the first essay of his "Order of Nature," (§ 4, p. 173, note,) while discussing the "Theory of Life" and "Life in Geological Epoch," has uttered a protest against the use of the word in the following terms:

> "While on this subject I cannot omit to take this occasion of recording my protest against the now prevalent, but barbarous use of the term 'Biology.' βὶος never means 'life' in the sense of 'vitality;' it means the 'life' of a man as progressing in *time*—his birth, actions, and death. Plato has 'βὶος ζωῆς,' the lifetime of a life. (Epinomis, [or the Philosopher,] 982.) Unfortunately the term 'Zoology,' which would be the proper one for this branch of science, has been already appropriated to what ought to have been called 'Zoography;' but there is still 'Zoonomy,' the science of the laws of life, open to adoption, and, at any rate, much better than '*biology*,' which, if it means anything, would be a theory of the facts of *biography*." *

On the other hand, a still more eminent and probably better scholar in Greek philology, William Whewell, has preferred the term biology to any other. In his "History of Scientific Ideas," under the caption of "The Philosophy of Biology," (Vol. 2, p. 170,) he urges that "the word *Physiology*, by which they [that is, to use again his own words, 'the organical sciences'] have most commonly been described, means the *science of nature;* and though it would be easy to explain, by reference to history, the train of thought by which the word was latterly restricted to *living nature*, it is plain that the name is, etymologically speaking, loose and improper. The term *biology*, which means exactly what we mean to express, *the science of life*, has often been used, and has of late become not uncommon among good writers."

It may be added that the word βὶος, although doubtless generally used in the sense of lifetime, as urged by Baden Powell, nevertheless does not appear to have been limited to such meaning, but to have had practically the same range as our word life. Even if it were so limited, however, it would be eminently appropriate from the standpoint from which all scientific students of nature now take view, for it is the lifetime of nature and the questions of how organisms have been evolved and how grown and developed that must interest the students of life, plants and animals, as well as those organisms neither plants nor animals that formerly existed and still survive.

It is in fact the sum of those phenomena which may be aptly described as constituting the lifetime of nature that forms the true aim of what may, with the strictest and exact propriety, be called BIOLOGY.

The word seems to have been also used quite generally by entomologists in a very restricted sense; that is, as a common denominator for whatever relates to the special habits and manners of insects in contradistinction to Physiology. Thus Hagen, in his *Bibliotheca Entomologica*, (1863,) groups all entomological treatises under eight categories, viz: (1) Accessories and Generals; (2) General Entomology; (3) Special Entomology, *i. e.*, the subordinate groups, orders, etc. (4) Anatomy; (5) Physiology; (6) *Biology*; (7) Benefits from Insects; and (8) Injuries from Insects. This summary will give some idea of what entomologists intend by the word, and the original sense of the word, as indicated by Plato in the connection already indicated, might be used as an argument in justification. There would, indeed, be no strong objection to the use of the word to signify a study of habits had it not been abready, by general consent, used in another sense. Our well considered rules, as well in zoology as in botany, that priority determines the use of a name, and that the same name cannot be well used in two different senses, combine with the universal consecration of the term otherwise, to forbid us to use it in the limited sense indicated.

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* Powell, Order of Nature, Essay 1, § 4, p. 172, note, Theory of Life.

ALPHABETICAL INDEX.

A.

Page.

Academy of Sciences, Washington.... 40, 42
Accounts, auditing.... 22
Address, presidential.... 22, 26, 36
Agassiz, Mr. Alexander.... 9
Ageronia feronia.... 73
Alaska.... 25
Allen, Dr. Harrison.... 36
Allen, Mr. J. A.... 9
Amendments to the Constitution.... 23
Ampelopsis quinquefolia.... 28
Angræcum sesquipedale.... 76
Animals, Mortality of.... 30
Animals, Well Known.... 39
Anthropology, French, School of.... 40
Anthropology, What is.... 38
Anthropological Society.... 5, 36, 37, 41, 42, 43
Anthropologists in Biology.... 35
Appalachian Mountains, Contrasts of.... 38
Arrearages.... 22
Arrearages, penalty for.... 24
Arteries, Ramifications of the.... 40
Ashford, Dr. F. A.... 11
Assessments, collection of.... 22

B.

Baird, Prof. S. F.... 5, 9, 36
Baker, Dr. Frank.... 11, 30, 40
Baker on Ramifications of Arteries.... 40
Baker on Darwin's Expression of Emotions 87
Ballots, count of.... 22
Barker, Mr. J. S.... 11
Barnard, Dr. Wm. S.... 11
Bats, suctorial organs of.... 28
Bean, Dr. Tarleton H.... 11, 25, 35, 44
Bean, Voyage to Alaska and Siberia.... 25
Bean on Spoonbill Sandpiper.... 44
Bessels, Dr. Emil.... 11
Beyer, Dr. H. G.... 11
Bibliography, Darwinian.... 92
Billings, Dr. John S.... 11, 42
Biology, Anthropologists In.... 35
Biology, Use of Term.... 102
Biology, Zuñi.... 41
Birney, Mr. H. H.... 11, 30
Birney, General William.... 11, 44
Blepharocera.... 28
Blish, Mr. J. B.... 11
Blood corpuscles, diseased.... 27

Page.

Botanist, Darwin as a.... 81
Bransford, Dr. J. F.... 11
Brewer, Prof. W. H.... 9, 39
Brewster, Mr. Wm.... 9
Broca, Paul.... 40
Brooks, Dr. W. K.... 9
Brown, Mr. J. T.... 11
Brown, Mr. S. C.... 12
Burdick, Mr. E. A.... 12
Burnett, Dr. Swan M.... 12, 41
Burnett on "How we See".... 41
Busey, Dr. S. C.... 12
Business, miscellaneous.... 23

C.

Canby, Mr. W. J.... 12
Carman, Dr. M. A.... 12
Cassia chamæcrista.... 28
Chase, Mr. H. S.... 12
Chiasmodontidæ.... 35
Chickering, Prof. J. W.... 12, 25, 28, 35, 38, 39, 42
Chickering, Mr. J. J.... 12
Chiasmodus niger.... 35
Chickering on Appalachian Mountains.... 38
Chickering on Roan Mountain and its flora.. 28
Christie, Mr. A. S.... 12
Chrysemys picta.... 32
Cicada, the Periodical.... 32
Clark, Mr. A. H.... 12, 30
Clupea sapidissima.... 33
Collett, Dr. Robert.... 9
Collins, Captain J. W.... 12, 32
Collins on the Mackerel Fishery.... 32
Committees, appointment of.... 21
Committees, reports of.... 23
Comstock, Prof. J. H.... 12, 25, 30, 81
Comstock on Scale Insects.... 31
Conant, Mr. W. P.... 12
Constitution.... 21–23
Constitution, adoption of.... 25
Constitution, amendments to.... 23
Constitution, amendments propsed by Baker 39
Constitution, Committee on.... 24
Correspondence, conduct of.... 22
Coryydalis cornutus.... 28
Coues, Dr. Elliott.... 12, 36, 37, 38
Coues on Advances in Ornithology.... 38
Council, list of.... 7
Council, composition of.... 21

Page.

Council, duties of 22
Council, minutes of 22
Council, presiding officer 22
Council, quorum of 21
Cox, Mr. W. V 13
Cretaceous Beds of Maryland 38
Cushing on Zuñi Biology 41

D.

Dale, Dr. F. C 13
Dall, Prof. William H 13, 29, 40, 44
Dall, Biography of Darwin 56-59
Dall on Deep-Sea Explorations 40
Dall on mollusks of Dist. Columbia 44
Danias archippus 79
Darwinian Bibliography 92-101
Darwin, Biography of 56-59
Darwin as a Botanist 81
Darwin's Contributions to Philosophy 60-70
Darwin on Expression of Emotion 87
Darwin Memorial Meeting 40, 43, 45
Darwin, Mrs. Heideman's bust of 43
Darwin, The Doctrine of 47-55
Darwin, Ulke's portrait of 43
Davis, Prof. H. C 13
De Haas, Dr. Wills 13
Deep-Sea Explorations 40
Derby, Prof. O. A 9
Dewey, Dr. F. P 13
Disbursements 22
Discussions 23
District of Columbia, flora of 26, 31
District of Columbia, mollusks of 44
Dodge, Mr. C. R 13
Dosh, Mr. F. B 13
Drosera 76
Dutton, Captain C. E 24

E.

Earll, Mr. R. E 13, 30, 34
Elliott, Mr. Henry W 13, 33, 36, 37
Elliott on Arctic Sea-cow 36, 37
Elliott on Sea-otter 33
Ellzey, Dr. M. G 13, 44
Ellzey on Mules 44
Emotions, Expression of 87
Eurynorhynchus pygmæus 44
Evolution, anthropologic 67
Evolution, biologic 67
Evolution, physical 67
Exhibition of specimens 23
Explorations, Deep-Sea 40
Expression of Emotions 87

F.

Farlow, Prof. Wm. G 9
Fee, annual 23

Page.

Fee, initiation 23
Fees, collection of 22
Ferguson, Major T. B 13
Finances, direction of 22
Fish Commission, explorations of 34
"Fish Hawk," steamer 34
Fish mortality 30
Fishes, Günther's Study of 29
Fishery, Mackerel 32
Fletcher, Dr. Robert 13, 30, 40
Fletcher on Paul Broca 40
Flint, Dr. J. M 13, 30
Flora Columbiana 26
Flora of District of Columbia 31
Flora of Roan Mountain 28
Foreman, Dr. E 13
Foreman on Cretaceous Beds of Maryland 38
Founder 11

G.

Garrett, Mr. L. M 14
Gannett, Mr. Henry 14
Gedney, Mr. C. D 14
Geotropism 83, 85
Giglioli, Dr. E. H 10
Gihon, Dr. A. L 14, 39
Gilbert, Mr. Charles H 26
Gilbert, Mr. G. K 14, 39
Gill, Prof. Theodore 14, 24, 25, 28, 29, 30, 33,
34, 35, 36, 37, 38, 41, 42, 43, 47
Gill, Principles of Biology 26
Gill on Use of term Biology 102
Gill on Darwin 47-55
Gill on Views of Nature 37
Gill on Great-Swallower 35
Gill on Günther's Study of Fishes 29
Gill on History of Classification 36
Gill on Suctorialism in Marsupiates 28
Glass snake 35
Goode, Mr. G. Brown 3, 7, 14, 24, 25, 29, 30, 32,
34, 35, 37, 39, 40, 41, 42, 44
Goode on the Mackerel 32
Goode on Statistics of Societies of Washington 43
Goode on Taxidermy 40
Gore, Prof. J. H 14, 30
Gray, Prof. Asa 10, 95
Great plains, absence of trees 34
Griffith, Dr. S. H 14
Grimm, Prof. Oscar von 10
Growth, retardation of 34
Günther, Dr. A. C. G 35
Günther's study of fishes 29

H.

Hammond, Dr. William A 36
Hassler, Dr. F. A 14

Page.
Hawes, Dr. George W 14, 30
Hawes, Dr. George W., death of 14
Hawkes, Dr. W. H 14
Haydon, Mr. E. E 14
Hayden, Dr. F. V 36
Heideman, Mrs. Mica 43
Heliotropism 83, 85
Henshaw, Mr. H. W 15
Hessel, Dr. R 15
High Island 30
Hoffman, Dr. W. J 15, 30
Hog, Tape-worm from 32
Hooker, Sir Joseph D 72
Hornaday, Mr. W. T 15
Hough, Dr. F. B 15
Hough, Mr. M. B. W 15
Howard, Mr. L. O 15, 30
How we See 41
Howland, Dr. E. P 15
Hyatt, Prof. A 10
Hypotheses, working 67

I.

Ingersoll, Mr. Ernest 15, 24, 30
Ingersoll on Mortality of Marine Animals 30
Insects, Scale 31
Introductory note 5

J.

Jabirandi, Physiological Action of 31
Johnson, Mr. A. B 15
Johnson, Mr. B. F 15
Johnson, Dr. J. T 15
Jordan, Prof. D. S 26
Jordan on Salmon of the Pacific Coast 26
Jouy, Mr. P. L 15

K.

Kennicott, Dr. Robert 36
Kerguelen's Land 72
Kidder, Dr. J. H 15, 25, 27, 35, 72
Kidder on External Air of Washington 27
King, Dr. A. F. A 7, 15, 25, 28, 30, 39
King, Septenary Periodicity 28
Koebele, Mr. A 16

L.

Lamarck 40
Lamphyrus occidentalis 73
Lawrence, Mr. Geo. N 10
Lectures, Saturday 37
Lee, Dr. Wm 16
Leech, Mr. D 16
Lehnert, Rev. E 16
Limenitis disippus 79
Locusts 32

M.

McDonald, Col. M 16, 28, 32, 34
McDonald on Experiments in Fish Culture 32
McDonald on Periodicity in Development 28
McDonald on Shad in Confinement 34
McMurtrie, Dr. Wm 16
Mackerel 32
Mallory, Col. Garrick 42
Mann, Mr. B. P 16
Marsh, Mr. C. C 16
Marsupiates, Suctorial Powers of 28
Martin, Mr. Frank 16
Marx, George 16, 30
Mason, O. T 7, 16, 25, 30, 35, 43
Mason on What is Anthropology 38
Mason on Anthropologists in Biology 35
Matthews, Patrick 50
Meek, F. B 36
Meeting, annual 22
Meeting, first annual 26
Meeting, second annual 35
Meeting for organization 24
Meeting, preliminary 24
Meetings, field 23, 30
Meeting, notice of 22
Meetings, special 23
Meeting, stated 22
Member, original 11
Members, active, list of 11-20
Members, balloting for 23
Members, classification of 21
Members, corresponding, list of 9, 10
Members, election of 21
Members, honorary, list of 9
Members, women as 44
Membership, nominations for 22, 23
Membership, proposals for 21
Merrill, Mr. George P 16-30
Mesmerism in animals 33
Mexico, Gulf of 30
Micrococcus septicus 31
Microtome, Freezing 33
Miller, Mr. Benj 16
Miner, Mr. R. H 16
Minutes of proceedings 22
Minutes, reading of 23
Molluscan fauna of D. C 44
Mollusks, Antiquity and Extinction of 34
Morse, Prof. Edward S 10
Müller, Fritz 76
Müller, Herman 76
Mules 44
Mythology 61

N.

Page.
Name of the Society.......... 21, 24, 102
Nares, Sir George S.......... 40
National Museum.......... 26, 27, 30, 31, 35, 37, 40, 44
Nature, Scientific and Popular Views of.......... 37
Nelson, Mr. E. W.......... 16
Newberry, Prof. J. S.......... 36
Norris, Dr. Basil.......... 16

O.

Object of the Society.......... 21
Odontoscelis Darwinii.......... 71
Officers.......... 7
Officers, classification of.......... 21
Officers, election of.......... 22, 23
Officers for 1880.......... 25
Officers for 1881.......... 26
Officers for 1882.......... 35
Officers, term of office.......... 22
Opalization.......... 33
Opheosaurus ventralis.......... 35
Order of business.......... 23
Order of business, suspension of.......... 23
Ornithology, advances in.......... 38
Osten Sacken, Baron R. von.......... 36

P.

Packard, A. S., Jr.......... 10
Papers, reading and discussion of.......... 21, 23
Patagonia, insect fauna of.......... 71
Patton, Mr. W. H.......... 17, 24, 28, 30
Peale, Titian R.......... 36
Pergande, T.......... 17, 30
Periodicity, laws of.......... 28
Periodicity, Septenary.......... 28
Petrifaction.......... 33
Phenomena, anthropologic, categories of.......... 66
Phenomena, biologic, categories of.......... 66
Phenomena, classification of.......... 66
Phenomena, physical, categories of.......... 66
Philosophy, classification of.......... 61
Philosophy, definition of.......... 60
Philosophy, metaphysic.......... 62
Philosophy, scientific.......... 63
Philosophical Society.......... 36, 41, 42, 43
Photomicrographs.......... 27, 31
Pilocarpus pinnatifolius.......... 31
Polymorphism, animal.......... 41
Porter, Dr. J. H.......... 17
Potomac Side Naturalist's Club.......... 36
Pourtales, Count L. F. De.......... 36
Powell, Rev. Baden.......... 50, 53
Powell, Major J. W.......... 17, 37, 39, 42, 43, 60
Powell on Darwin's Contribution to Philosophy.......... 60–70
Powell, Introduction to Saturday Lectures.......... 37
Powell on Sociology.......... 39

Page.
Prehension, suctorial.......... 27
Prentice on Jabirandi.......... 31
Prentiss, Dr. D. W.......... 7, 17, 28, 30, 31 35, 36, 38, 44
Prentiss on Mesmerism in Animals.......... 38
President, duties of.......... 22
President, retiring.......... 22
Presidential address.......... 22
Presidential address for 1881.......... 26
Presidential address for 1882.......... 36
Proceedings, printing of.......... 44
Proceedings of the Society.......... 24–44
Programme, provision for.......... 22
Pronuba.......... 27, 80
Prodoxus.......... 27
Pseudomorphs.......... 33
Pusa lutris.......... 33

Q.

Quorum.......... 21

R.

Rabbits, Septicæmia in.......... 29
Rathbun, Mr. Richard.......... 3, 7, 17, 24, 25, 29, 30, 34, 35, 42, 44
Rathbun on Explorations of Fish Commission.......... 34
Rau, Dr. Chas.......... 17
Renilla, Embryology of.......... 41
Retardation of Growth.......... 34
Reyburn, Dr. Robert.......... 17
Rhytina Stelleri.......... 36, 37
Richey, Dr. S. O.......... 17
Ridgway, Robert.......... 17, 25, 30, 32, 35
Ridgway on Turkeys.......... 32
Riley, Prof. C. V.......... 17, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 39, 41, 42, 43, 44, 70, 79, 80
Riley on Darwin in Entomology.......... 70–77
Riley, Facts about Animals.......... 39
Riley, Fertilization of Yucca.......... 27
Riley, Reminiscences of Darwin.......... 77
Riley on Retardation of Growth.......... 34
Riley on Locusts.......... 32
Riley on Scale Insects.......... 31
Riley on Suckers of the Helgramite, etc.......... 28
Roan Mountain and its Flora.......... 28
Russell, Mr. I. C.......... 17
Ryder, Mr. John A.......... 17, 33
Ryder on Development of Shad.......... 33

S.

Salmon of Pacific Coast.......... 26
Sandpiper, Spoonbilled.......... 44
Saturday Lectures.......... 37
Scale insects.......... 31
Schaeffer, E. M.......... 17, 33
Schönborn, Mr. H.......... 17

Page.
Schuerman, Mr. C. W........ 17, 30
Schwartz, Mr. E. A........ 18, 30
Science, definition of........ 64
Scudder. Mr. C. W,........ 18, 30
Scudder, Mr. N. P........ 18, 28, 30, 32, 40
Scudder on Breeding of Tortoise........ 32
Sea-cow, Arctic........ 36, 37
Seaton, Hon. C. W........ 18
Seaman, Prof. W. H........ 18, 30, 31
Sea-otter 33
Sections, chairman of........ 29
Sections, formation of........ 22, 29
Seeley, Col. F. A........ 43
Septenary Periodicity........ 28
Shad, Eggs of........ 33
Shad in Confinement........ 34
Sheldon, Mr. C. S........ 18, 30
Shufeldt, Dr. R. W 18, 35
Shufeldt on Glass Snake........ 35
Shute. Mr. D. K........ 18
Siberia........ 25, 44
Simulium, sp........ 28
Smiley, C. W........ 18, 30
Smith, Prof. S. I........ 10
Smith, Mr. W. R........ 18
Smithsonian Institution, Secretary of........ 5
Sociology, Outlines of........ 39
Solanum rostratum........ 28
Specimens, exhibition of........ 33
Steinegger, L........ 18
Sternberg, Dr. George M........ 18, 29, 30, 31
Sternberg on micrococcus........ 31
Sternberg on Septicæmia........ 29
Stevenson, Mr. James........ 18
Stimpson, Mr. W. G........ 18
Streets, Dr. T. H........ 18
Suckers of plants........ 28
Suckley, Dr. George........ 36
Suctorial Prehension........ 27

T.

Taylor, F. W 19
Taylor, Dr. Thomas........ 19, 30, 31, 33
Taylor, Dr. William B........ 42
Taylor on Freezing Microtome........ 33
Taylor on Tape-worm from Hog........ 32
Tape-worm from Hog........ 32
Taxidermic Skill........ 40
Taxonomy........ 26
Terra del Fuego, insect fauna of........ 71
Thompson, Dr. J. Ford........ 19
Todd, Prof. J. E........ 19, 28
Todd on Flowering of Solanum, etc........ 28
Tonor, Dr. J. M........ 19
Tortoise, painted........ 32
Tortoises, Land, of North America........ 35

Page.
Treasurer, duties of........ 22
Trees, Absence on Great Plains........ 34
True, Mr. Frederick W.... 19, 24, 27, 30, 32, 35, 36, 37, 39, 44
True, Darwinian bibliography........ 92
True on Arctic Sea-cow,........ 36, 37
True on Land Tortoises........ 35
True on Suctorial Prehension in Animals..... 27
True on Siren lacertina 36
True on Zoologischer Jahresbericht........ 32
Turkeys, wild and domesticated........ 32
Turner, Mr. L. M........ 19

U.

Ulke, Mr. Henry........ 19, 25, 30, 34, 35, 36, 43, 44
Upham, Mr. E. P........ 19

V.

Vasey, Dr. George........ 7, 19, 24, 25, 30, 35
Velie, Dr. J. W........ 10
Verrill, Prof. A. E 10
Vestiges of Creation........ 40, 50
Vice-President, duties of........ 22
Vote, privilege of........ 23

W.

Walsh, Mr. Benjamin Dann........ 70
Ward, Prof. Lester F...... 3, 7, 19, 25, 26, 27, 29, 30, 31, 34, 35, 36, 38, 39, 42, 44
Ward on Darwin as a Botanist........ 81
Ward, Exhibition of Petrifaction........ 33
Ward on Flora Columbianæ of 1830 and 1880.. 26
Ward, statistics of flora of D. C........ 31
Ward on Trees on Great Plains 34
Washington, external air of........ 27
Washington, scientific societies of........ 36, 40, 41
Waterhouse, G. R........ 71
Watson, Sereno........ 10
Weir, Dr. J. Jenner........ 77
Welling, Dr. James C........ 42
Wells, Dr. W. C........ 50
White, Dr. C. A........ 19, 26, 27, 34
White, Mr. M. P........ 19
White on Antiquity and Extinction of Mollusks 34
White on Collection of Fossils........ 27
Wilder, Prof. Burt G........ 36
Williams, Mr. A........ 19, 30
Wilson, Mr. J. M........ 20
Wilson, Dr. Edmund B........ 10, 41
Wilson on Renilla........ 41
Winslow, Mr. F........ 26
Wolfley, Mr. W. J........ 20, 30, 39
Women, admission of........ 44

Y.

Page.

Yarnall, Dr. J. H 20
Yarrow, Dr. H C 20
Yeates, Mr. W. S 20
Yellow fever 27
Yucca, fertilzation of 27

Z.

Page.

Zoological Record 32
Zoologischer Jahresbericht 32
Zoology, classification in 36
Zumbrock, Dr. A 20
Zuñi biology 41